EPA/ROD/R08-90/036
1990

EPA Superfund
Record of Decision:

ROCKY MOUNTAIN ARSENAL (USARMY)
EPA ID: CO5210020769
OU 16
ADAMS COUNTY, CO
02/26/1990

Text:
THE
US ENVIRONMENTAL PROTECTION AGENCY (EPA), THE ARMY, THE DEPARTMENT OF THE INTERIOR, THE DEPARTMENT OF HEALTH AND HUMAN SERVICES, AND THE DEPARTMENT OF JUSTICE, WHICH ESTABLISHED PROCEDURES FOR IMPLEMENTING THE ARSENAL CLEANUP PROGRAM AS SPECIFIED IN THE TECHNICAL PROGRAM PLAN, AND INCORPORATED MANY PROVISIONS OF THE MODIFIED PROPOSED CONSENT DECREE. THE ARMY AND SHELL OIL COMPANY AGREED TO SHARE CERTAIN COSTS OF THE REMEDIATION TO BE DEVELOPED AND PERFORMED UNDER THE OVERSIGHT OF THE EPA WITH OPPORTUNITIES FOR PARTICIPATION BY THE STATE OF COLORADO. THE LONG-TERM REMEDIATION IS A COMPLEX TASK THAT WILL TAKE SEVERAL YEARS TO COMPLETE. THE FEDERAL FACILITY AGREEMENT SPECIFIES 13 INTERIM RESPONSE ACTIONS (IRA) DETERMINED TO BE NECESSARY AND APPROPRIATE. THE REMEDIATION OF OTHER CONTAMINATION SOURS IS ONE OF THE 13 IRAS. THE M-1 SETTLING BASINS AREA IS ONE OF SEVERAL SITES BEING ADDRESSED BY THE REMEDIATION OF OTHER CONTAMINATION SOURCES IRA. THE ACTION AT THIS SITE CONSISTS OF ASSESSMENT AND, AS NECESSARY, THE SELECTION AND IMPLEMENTATION OF AN INTERIM ACTION.

#IRAO
INTERIM RESPONSE ACTION OBJECTIVE

THE OBJECTIVE OF THE INTERIM RESPONSE ACTION (IRA) ALTERNATIVES ASSESSMENT FOR THE M-1 SETTLING BASINS IS TO ASSESS WHETHER IMMEDIATE ACTION AT THIS SITE IS APPROPRIATE AND TO RECOMMEND, IF NECESSARY, AN IRA ALTERNATIVE TO MITIGATE THE THREAT OF RELEASE FROM THE M-1 SETTLING BASINS ON AN INTERIM BASIS, PENDING DETERMINATION OF THE FINAL REMEDY IN THE ONPOST RECORD OF DECISION (ROD).

THE IRA ALTERNATIVES HAVE BEEN EVALUATED BASED ON THE FOLLOWING CRITERIA:

* OVERALL PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

* COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) TO THE MAXIMUM EXTENT PRACTICABLE

* REDUCTION OF MOBILITY, TOXICITY, OR VOLUME

* SHORT-TERM AND LONG-TERM EFFECTIVENESS

* IMPLEMENTABILITY

* COST

THIS DECISION DOCUMENT PROVIDES A SUMMARY OF THE ALTERNATIVE TECHNOLOGIES CONSIDERED, A CHRONOLOGY OF THE SIGNIFICANT EVENTS LEADING TO THE INITIATION OF THE IRA, A SUMMARY OF THE IRA PROJECT, AND A SUMMARY OF THE ARARS (LEGAL AND REGULATORY STANDARDS, CRITERIA, OR LIMITATIONS) ASSOCIATED WITH THE PROGRAM.

AS SPECIFIED IN THE FEDERAL FACILITY AGREEMENT, THIS IRA WILL, BY CONTAINING AND TREATING A CONTAMINATION SOURCE, TO THE MAXIMUM EXTENT PRACTICABLE, BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF THE FINAL RESPONSE ACTION.

#IRAA
INTERIM RESPONSE ACTION ALTERNATIVES

THIS SECTION DESCRIBES THE INTERIM RESPONSE ACTION (IRA) ALTERNATIVES DEVELOPED IN THE IRA ALTERNATIVES ASSESSMENT FOR THE M-1 SETTLING BASINS

(WCC 1989A). THESE ALTERNATIVES INCLUDED:

* NO ACTION
* MONITORING
* INSTITUTIONAL CONTROLS
* SLURRY WALL WITH CAP
* MULTILAYERED CAP
* IN SITU VITRIFICATION
* CHEMICAL FIXATION WITH ONSITE STORAGE
* CHEMICAL FIXATION WITH OFFSITE DISPOSAL

ALL OF THESE ALTERNATIVES WERE SUBJECT TO AN EVALUATION IN THE IRA ALTERNATIVES ASSESSMENT. THE IRA ALTERNATIVES ASSESSMENT FOR THE M-1 SETTLING BASINS CONCLUDES THAT THERE APPEARS TO BE BOTH A LONG-TERM TECHNICAL AND COST BENEFIT IN PERFORMING AN IRA NOW SINCE TREATMENT AFTER ARSENIC HAS SPREAD BECOMES BOTH MORE COMPLEX AND COSTLY INSOFAR AS A LARGER AREA MUST BE ADDRESSED.

FOLLOWING IS A DESCRIPTION AND A BRIEF SUMMARY OF THE EVALUATION OF EACH ALTERNATIVE. ALL OF THE ALTERNATIVES CAN BE DESIGNED AND IMPLEMENTED TO MEET APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) TO THE MAXIMUM EXTENT PRACTICABLE. DETAILS OF THE EVALUATION CAN BE FOUND IN THE IRA ALTERNATIVES ASSESSMENT FOR THIS SITE (WCC 1989A).

NO ACTION

THIS ALTERNATIVE CONSISTS OF TAKING NO ACTION TO CONTAIN OR TREAT CONTAMINATED SOIL AND SLUDGE AT THE M-1 SETTLING BASINS. THIS ALTERNATIVE IS NOT CONSIDERED PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT AND WOULD NOT REDUCE CONTAMINANT MOBILITY, TOXICITY, OR VOLUME. THIS ALTERNATIVE HAS NO SHORT-TERM IMPACTS, HOWEVER, IT ALSO HAS NO LONG-TERM EFFECTIVENESS. IT COULD BE EASILY IMPLEMENTED AT NO COST. THE NO ACTION ALTERNATIVE WOULD NOT BE INCONSISTENT WITH ANY FINAL REMEDY AT THE SITE.

MONITORING

THIS ALTERNATIVE CONSISTS OF CONSTRUCTING UPGRADIENT AND DOWNGRADIENT GROUNDWATER SAMPLING AND ANALYSIS. MONITORING WOULD ALLOW CONTINUED TRACKING OF CONTAMINANT MOVEMENT, THEREBY PROVIDING ADDITIONAL INFORMATION WHICH COULD BE USED TO CONTINUE TO EVALUATE THE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. MONITORING WOULD NOT REDUCE CONTAMINANT MOBILITY, TOXICITY, OR VOLUME. IT WOULD HAVE MINIMAL SHORT-TERM IMPACTS ON WORKERS DURING MONITORING WELL INSTALLATION, WHICH COULD BE MITIGATED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT. THE LONG-TERM EFFECTIVENESS OF THIS ALTERNATIVE IS LIMITED TO ITS USE AS AN INDICATOR OF FUTURE IMPACT AT SENSITIVE RECEPTOR. IT COULD BE EASILY IMPLEMENTED AT A RELATIVELY LOW COST. THE MONITORING ALTERNATIVE WOULD NOT BE INCONSISTENT WITH ANY FINAL REMEDY AT THE SITE. GROUNDWATER MONITORING WOULD ALSO BE INCLUDED IN ALL FOLLOWING ALTERNATIVES.

INSTITUTIONAL CONTROLS

THIS ALTERNATIVE CONSISTS OF CONSTRUCTING A CHAIN-LINK FENCE WITH CONTROLLED ACCESS POINTS AROUND THE M-1 SETTLING BASINS. IN ADDITION, GROUNDWATER MONITORING WOULD BE CONDUCTED. THE MONITORING ASPECT OF THIS ALTERNATIVE WOULD ALLOW CONTINUED TRACKING OF CONTAMINANT MOVEMENT, THEREBY PROVIDING ADDITIONAL INFORMATION WHICH COULD BE USED TO CONTINUE TO EVALUATE THE PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT. IT WOULD NOT REDUCE CONTAMINANT MOBILITY, TOXICITY, OR VOLUME. THIS ALTERNATIVE WOULD ALSO HAVE MINIMAL SHORT-TERM IMPACTS DURING FENCE CONSTRUCTION WHICH COULD BE MITIGATED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT. RMA CURRENTLY HAS LIMITED ACCESS MAINTAINED BY

PHYSICAL BARRIERS AND SECURITY PERSONNEL. THEREFORE, ADDITIONAL SITE RESTRICTIONS WOULD BE OF LIMITED EFFECTIVENESS. THESE INSTITUTIONAL CONTROLS WOULD NOT BE INCONSISTENT WITH ANY FINAL REMEDY AT THE SITE, AND COULD BE EASILY IMPLEMENTED AT A RELATIVELY LOW COST.

SLURRY WALL WITH CAP

THIS ALTERNATIVE CONSISTS OF CONSTRUCTING A SLURRY WALL AROUND THE M-1 SETTLING BASINS. IN ADDITION, GROUNDWATER MONITORING WOULD BE CONDUCTED. THE SLURRY WALL WOULD BE ANCHORED A MINIMUM OF 5 FEET INTO THE DENVER FORMATION, WHICH WOULD PROVIDE A RELATIVELY IMPERMEABLE BASE FOR THE CONTAINED AREA. THIS WOULD LIMIT HORIZONTAL MIGRATION OF CONTAMINATION AS A RESULT OF ALLUVIAL GROUNDWATER FLOW THAT IS PERIODICALLY IN CONTACT WITH THE M-1 SETTLING BASINS. A MULTILAYERED CAP WOULD THEN BE CONSTRUCTED OVER THE M-1 SETTLING BASINS. FOR THE PURPOSES OF THIS STUDY ONLY, IT HAS BEEN ASSUMED THAT THE CAP WOULD CONSISTS OF, FROM THE BASE UPWARDS, AN 18-INCHES-THICK LAYER OF LOW PERMEABILITY CLAY, A FLEXIBLE MEMBRANE LINER, A SYNTHETIC DRAINAGE NET, A GEOTEXTILE FILTER FABRIC, AND A 1-FOOT-THICK PROTECTIVE SOIL LAYER. THE CAP WOULD BE SLOPED FROM THE CENTER OF THE BASINS TO FACILITATE RUNOFF. THE CAP WOULD REDUCE INFILTRATION OF PRECIPITATION AND SURFACE WATER.

THIS ALTERNATIVE IS CONSIDERED PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, SINCE THE WASTE MATERIAL IS ISOLATED FROM THE ENVIRONMENT. BOTH VERTICAL AND HORIZONTAL CONTAMINANT MIGRATION WOULD BE GREATLY INHIBITED. HOWEVER, THIS ALTERNATIVE DOES NOT AFFECT THE TOXICITY OF THE MATERIAL AND MAY ACTUALLY INCREASE THE VOLUME OF MATERIAL THAT MAY ULTIMATELY REQUIRE REMEDIATION, SINCE SOME OF THE CONTAINMENT MATERIAL MAY COME IN CONTACT WITH THE SLUDGE. ANY MINIMAL SHORT-TERM IMPACTS TO WORKERS OR THE COMMUNITY COULD BE ADDRESSED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT AND ENGINEERING CONTROLS. THE LONG-TERM EFFECTIVENESS OF THIS ALTERNATIVE IS LIMITED SINCE THIS IS A CONTAINMENT TECHNOLOGY THAT DOES NOT ACTUALLY REMOVE OR TREAT THE SOURCE OF CONTAMINATION. THIS ALTERNATIVE COULD BE IMPLEMENTED WITH STRAIGHTFORWARD CONSTRUCTION TECHNIQUES AT A RELATIVELY MODERATE COST. CONTAINMENT WOULD BE CONSISTENT WITH THE FINAL REMEDY BECAUSE IT WOULD REDUCE POTENTIAL CONTAMINANT MIGRATION.

MULTILAYERED CAP

THIS ALTERNATIVE WOULD CONSIST OF CONSTRUCTING A MULTILAYERED CAP OVER THE M-1 SETTLING BASINS AS DESCRIBED IN SUBSECTION 4.4. IN ADDITION, GROUNDWATER MONITORING WOULD BE CONDUCTED. THE CAP WOULD INHIBIT INFILTRATION OF PRECIPITATION AND SURFACE WATER. HOWEVER, A CAP WOULD NOT ADDRESS THE HORIZONTAL FLOW OF THE ALLUVIAL AQUIFER THROUGH THE M-1 SETTLING BASINS, WHICH IS PROBABLY A MORE SIGNIFICANT MIGRATION PATHWAY IN THIS AREA THAN DOWNWARD MIGRATION BY INFILTRATION.

THIS ALTERNATIVE IS CONSIDERED PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THE CAP WOULD LIMIT THE DOWNWARD MOBILITY OF THE CONTAMINANTS. HOWEVER, IT WOULD HAVE NO EFFECT ON THE TOXICITY OF THE SLUDGE AND MAY ACTUALLY INCREASE THE VOLUME OF CONTAMINATED MATERIAL THAT WOULD ULTIMATELY HAVE TO BE TREATED, SINCE SOME OF THE CAP MATERIALS WOULD COME IN CONTACT WITH THE SLUDGE. THERE WOULD BE MINIMAL SHORT-TERM IMPACTS ASSOCIATED WITH THE IMPLEMENTATION OF THIS ALTERNATIVE, WHICH CAN BE ADDRESSED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT AND ENGINEERING CONTROLS. SINCE THIS IS A CONTAINMENT ALTERNATIVE, THE LONG-TERM EFFECTIVENESS IS LIMITED. THIS ALTERNATIVE COULD BE IMPLEMENTED WITH STRAIGHTFORWARD CONSTRUCTION TECHNIQUES AT A RELATIVELY LOW COST. CONTAINMENT WOULD BE CONSISTENT WITH THE FINAL REMEDY BECAUSE IT WOULD REDUCE POTENTIAL CONTAMINANT MIGRATION.

IN SITU VITRIFICATION

THIS ALTERNATIVE CONSISTS OF CONSTRUCTING A TEMPORARY 360-DEGREE SUBSURFACE BARRIER SUCH AS A SLURRY WALL OR SHEET PILINGS AROUND THE M-1 SETTLING BASINS TO TEMPORARILY HYDRAULICALLY ISOLATE THE SITE FROM THE SURROUNDING AQUIFER. THE SOIL/SLUDGE IN THE M-1 SETTLING BASINS WOULD THEN BE VITRIFIED BY INTRODUCING AN ELECTRIC CURRENT THROUGH A SQUARE ARRAY OF ELECTRODES SET IN THE SLUDGE. THE ELECTRIC CURRENT RAISES THE TEMPERATURE OF THE SLUDGE TO APPROXIMATELY 1600 DEGREES CENTIGRADE, FORMING A MELT THAT SUBSEQUENTLY COOLS TO A IMPERMEABLE GLASS. ANY ORGANICS IN THE SLUDGE ARE EITHER PYROLYZED IN THE MELT, RAPIDLY OXIDIZED AT THE SURFACE OF THE MELT OR CAPTURED IN THE OFFGAS TREATMENT SYSTEM. MOST OF THE MERCURY AND POSSIBLY SOME ARSENIC WOULD BE VAPORIZED AND SUBSEQUENTLY CONDENSED IN THE OFFGAS TREATMENT SYSTEM. THE REMAINDER OF THE ARSENIC AND THE OTHER METALS WOULD BE INCORPORATED INTO THE GLASS. AIR MONITORING WOULD BE CONDUCTED DURING IMPLEMENTATION OF THIS ALTERNATIVE. GROUNDWATER MONITORING WOULD ALSO BE CONDUCTED TO EVALUATE THE CONTINUED EFFECTIVENESS OF THIS ALTERNATIVE.

THIS ALTERNATIVE WOULD BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. CONTAMINANTS WOULD EITHER BE DESTROYED IN THE MELT PROCESS, CAPTURED IN THE OFFGAS TREATMENT SYSTEM, OR PERMANENTLY INCORPORATED IN THE GLASS. THE PROCESS SIGNIFICANTLY REDUCES THE CONTAMINANT MOBILITY, TOXICITY, AND VOLUME. THERE ARE SOME SHORT-TERM IMPACTS ASSOCIATED WITH THE IMPLEMENTATION OF THE PROCESS THAT CAN BE MITIGATED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT DURING CONSTRUCTION AND SETUP, AND THROUGH PROPER DESIGN OF THE OFFGAS TREATMENT SYSTEM. THIS ALTERNATIVE PROVIDES FOR LONG-TERM EFFECTIVENESS BECAUSE, FOR THOSE SOILS AND SLUDGES VITRIFIED, IT IS A PERMANENT TREATMENT AND LEAVES NO UNTREATED WASTE OR TOXIC AND MOBILE RESIDUALS ON SITE. THE TECHNOLOGY HAS GONE THROUGH TREATABILITY TESTING, WHICH HAS SHOWN ITS EFFECTIVENESS ON M-1 SETTLING BASINS SLUDGE. IMPLEMENTATION OF IN SITU VITRIFICATION WOULD REQUIRE OFFGAS MONITORING TO ENSURE THE EFFECTIVENESS OF THE AIR POLLUTION CONTROL EQUIPMENT. DUE PRIMARILY TO THE SIGNIFICANT POWER REQUIREMENTS TO MAINTAIN THE MELT, THE COSTS FOR THIS ALTERNATIVE ARE RELATIVELY HIGH. IMPLEMENTATION OF THIS ALTERNATIVE WOULD BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF THE FINAL RESPONSE ACTION BY PROVIDING SIGNIFICANT INTERIM REMEDIATION OF A SOURCE OF CONTAMINATION.

CHEMICAL FIXATION WITH ONSITE STORAGE

THIS ALTERNATIVE CONSISTS OF EXCAVATING THE SOIL AND SLUDGE IN THE M-1 SETTLING BASINS BY SECTIONS OR SUBAREAS, MIXING THE EXCAVATED MATERIALS WITH ONE OR MORE FIXATION AGENTS TO IMMOBILIZE THE CONTAMINANT TESTING THE TREATED PORTIONS TO ENSURE TREATMENT EFFECTIVENESS, AND PLACING THE TREATED SOIL/SLUDGE IN AN ONSITE TEMPORARY WASTE PILE. THE SEQUENCE WOULD BE REPEATED FOR SUCCESSIVE SUBAREAS UNTIL THE ENTIRE AREA TO BE CHEMICALLY FIXED IS TREATED. IN ADDITION, GROUNDWATER MONITORING WOULD BE CONDUCED.

AN ONSITE ABOVEGROUND TEMPORARY WASTE PILE WOULD BE CONSTRUCTED TO STORE THE CHEMICALLY FIXED MATERIALS. FOR THE PURPOSES OF THIS STUDY, THE BOTTOM LINER AND LEACHATE COLLECTION SYSTEM WOULD CONSIST OF, FROM THE BASE UPWARD, AN 18-INCH-THICK COMPACTED CLAY LAYER, A FLEXIBLE MEMBRANE LINER, A SYNTHETIC DRAINAGE NET, AND A GEOTEXTILE FILTER FABRIC. THE BOTTOM LAYER WOULD BE SLOPED AT A MINIMUM OF 2 PERCENT TOWARD A LEACHATE COLLECTION SUMP. ONCE THE CHEMICALLY FIXED MATERIALS HAVE BEEN PLACED IN THE WASTE PILE, A CAP WOULD BE CONSTRUCTED TO CLOSE THE TEMPORARY WASTE PILE. THE CAP DEIGN WOULD BE THE SAME AS THAT USED IN THE MULTILAYERED CAP ALTERNATIVE (SUBSECTION 4.4).

THIS ALTERNATIVE IS CONSIDERED TO BE PROTECTIVE OF HUMAN HEALTH AND THE

ENVIRONMENT SINCE THE CONTAMINANTS WOULD BE IMMOBILIZED BY THE FIXATION PROCESS. THE TOXICITY OF THE MATERIAL WOULD BE REDUCED BY THE CHEMICAL FIXATION, HOWEVER, THE VOLUME OF MATERIAL WOULD INCREASE. THIS ALTERNATIVE PROVIDES FOR LONG-TERM EFFECTIVENESS BECAUSE, FOR THE FIXED MATERIALS, IT IS A PERMANENT TREATMENT AND LEAVES NO UNTREATED WASTE OR TOXIC AND MOBILE RESIDUALS ON SITE. THERE WOULD BE SOME SHORT-TERM IMPACTS ASSOCIATED WITH IMPLEMENTATION WHICH COULD BE ADDRESSED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT AND ENGINEERING CONTROLS FOR ODOR AND DUST. ALTHOUGH FIXATION TECHNOLOGY IS WELL ESTABLISHED AT SITES WITH SIMILAR WASTES, TREATABILITY TESTING WOULD BE REQUIRED TO ESTABLISH THE EFFECTIVENESS OF THE TECHNOLOGY ON THE SPECIFIC CONTAMINANTS AT THE SITE. THIS ALTERNATIVE COULD BE IMPLEMENTED AT MODERATE COST IMPLEMENTATION OF THIS ALTERNATIVE WOULD BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF THE FINAL RESPONSE ACTION BY PROVIDING INTERIM REMEDIATION OF A SOURCE OF CONTAMINATION.

CHEMICAL FIXATION WITH OFFSITE DISPOSAL

THIS ALTERNATIVE WOULD CONSIST OF EXCAVATING THE SLUDGE AND SOIL IN THE M-1 SETTLING BASINS AND CHEMICALLY FIXING THE MATERIALS IN THE SAME MANNER DESCRIBED IN SUBSECTION 4.7. THE CHEMICALLY FIXED MATERIALS WOULD THEN BE TRANSPORTED TO AN OFFSITE HAZARDOUS WASTE LANDFILL FOR DISPOSAL. IN ADDITION, GROUNDWATER MONITORING WOULD BE CONDUCTED TO EVALUATE THE CONTINUED EFFECTIVENESS OF THIS ALTERNATIVE.

THIS ALTERNATIVE IS CONSIDERED TO BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT SINCE THE CONTAMINANTS WOULD BE IMMOBILIZED BY THE FIXATION PROCESS. THE TOXICITY OF THE MATERIAL WOULD BE REDUCED BY THE CHEMICAL FIXATION, HOWEVER, THE VOLUME OF MATERIAL WOULD INCREASE. THIS ALTERNATIVE PROVIDES FOR LONG-TERM EFFECTIVENESS BECAUSE, FOR THE MATERIALS FIXED, IT IS A PERMANENT TREATMENT AND LEAVES NO UNTREATED WASTE OR TOXIC AND MOBILE RESIDUALS ON SITE. THERE WOULD BE SOME SHORT-TERM IMPACTS ASSOCIATED WITH IMPLEMENTATION WHICH COULD BE ADDRESSED THROUGH THE USE OF PERSONAL PROTECTIVE EQUIPMENT AND ENGINEERING CONTROLS FOR ODOR AND DUST. ALTHOUGH FIXATION TECHNOLOGY IS WELL ESTABLISHED AT SITES WITH SIMILAR WASTES, TREATABILITY TESTING WOULD BE REQUIRED TO ESTABLISH THE EFFECTIVENESS OF THE TECHNOLOGY ON THE SPECIFIC CONTAMINANTS AT THE SITE. THE COST ASSOCIATED WITH THIS TECHNOLOGY ARE RELATIVELY HIGH, PRIMARILY DUE TO OFFSITE TRANSPORTATION AND DISPOSAL. IMPLEMENTATION OF THIS ALTERNATIVE WOULD BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE AT THE FINAL RESPONSE ACTION BY PROVIDING INTERIM REMEDIATION OF A SOURCE OF CONTAMINATION.

CONCLUSIONS

IN SITU VITRIFICATION IS THE PREFERRED ALTERNATIVE. A TREATMENT IS PREFERABLE TO A CONTAINMENT ALTERNATIVE AT THIS SITE BECAUSE THE SOURCE VOLUME IS KNOWN, THE WASTE CHARACTERISTICS ARE WELL-DEFINED, THERE ARE HIGH CONCENTRATIONS OF CONTAMINANTS, AND BECAUSE THE SITE IS A GROUNDWATER CONTAMINATION SOURCE. THE ADVANTAGES OF IN SITU VITRIFICATION ARE THAT THE METALS ARE EITHER IMMOBILIZED OR CAPTURED AND THAT ANY ORGANIC CONTAMINANTS ARE DESTROYED, THEREBY REDUCING THE MOBILITY, TOXICITY, AND VOLUME OF THE MATERIAL. IN SITU VITRIFICATION WILL EFFECTIVELY PREVENT FUTURE POTENTIAL CONTAMINANT MIGRATION FROM THE M-1 SETTLING BASINS. THEREFORE, IMPLEMENTATION OF THIS ACTION NOW WILL YIELD A TECHNICAL BENEFIT AND POSSIBLY A COST BENEFIT, AND WILL BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF THE FINAL RESPONSE ACTION. IN ADDITION, DATA RESULTING FROM IMPLEMENTATION OF IN SITU VITRIFICATION AT THIS SITE IS BENEFICIAL BECAUSE IT WILL CONTRIBUTE TO THE ALTERNATIVES ASSESSMENT FOR THE FEASIBILITY STUDY.

ALTHOUGH THE CONTAINMENT ALTERNATIVES ARE LESS COSTLY IN THE SHORT-TERM, THE TREATMENT COST DURING ANY SUBSEQUENT FINAL REMEDIATION WOULD

INCREASE DUE TO THE INCREASED VOLUME OF MATERIAL, WHICH WOULD THEN INCLUDE THE CONTAINMENT CONSTRUCTION MATERIALS. CHEMICAL FIXATION WITH ONSITE STORAGE IS A LESS EXPENSIVE TREATMENT TECHNOLOGY, BUT AGAIN, THE CHEMICALLY FIXED MATERIALS, AS WELL AS THE WASTE PILE CONSTRUCTION MATERIALS, MAY NEED TO BE MOVED DURING THE FINAL REMEDY. CHEMICAL FIXATION WITH OFFSITE DISPOSAL IS AS COSTLY AS THE IN SITU VITRIFICATION, BUT IT DOES NOT HAVE THE ADVANTAGE OF ACTUALLY DESTROYING THE ORGANIC CONTAMINANTS, IT COULD RESULT IN SOME SHORT-TERM IMPACTS DURING INITIAL EXCAVATION ACTIVITIES, AND THERE IS SOME POTENTIAL FOR TRANSPORTATION RISKS.

#COE
CHRONOLOGY OF EVENTS

THE SIGNIFICANT EVENTS LEADING TO THE PROPOSED DECISION TO REMEDIATE SOILS IN THE M-1 SETTLING BASINS AS DESCRIBED IN SECTION 6.0 OF THIS REPORT ARE PRESENTED BELOW.

DATE	EVENT
JUNE 1987	STATE OF COLORADO, SHELL OIL COMPANY EPA AND THE ARMY DEVELOP AND AGREE, IN A JUNE 1987 REPORT TO THE COURT, TO A PROSPECTIVE HOT SPOT LIST WHICH IDENTIFIES CANDIDATE INTERIM RESPONSE ACTIONS (IRA) TO BE CONDUCTED. THE HOT SPOT LIST CONSISTS OF FIVE AREAS (THE SECTION 36 TRENCHES, THE SECTION 36 LIME PITS, THE M-1 SETTLING BASINS THE MOTOR POOL AREA, AND THE RAILROAD HOUSING TRACK IN THE RAIL CLASSIFICATION YARD) REFERRED TO AS OTHER CONTAMINATION SOURCES IN THE PROPOSED CONSENT DECREE (SECTION 9.1, PARAGRAPH L), AND IN THE FEDERAL FACILITY AGREEMENT, PARAGRAPH 22.1 (L).
JANUARY 31, 1989	THE ARMY INSTRUCTS WOODWARD-CLYDE CONSULTANTS (WCC) TO DEVELOP PLANS FOR INTERIM ACTION INVESTIGATION WORK IN RESPONSE TO THE HOT SPOT LIST. INTERIM ACTION INVESTIGATION WORK INCLUDES THE M-1 SETTING BASINS.
APRIL 13, 1989	A DRAFT FINAL TASK PLAN, INCLUDING THE WORK FOR THE M-1 SETTLING BASINS SUBMITTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE FOR COMMENT.
APRIL 17, 1989	FIELD INVESTIGATIONS BEGIN FOR THE OTHER CONTAMINATION SOURCES IRA. WORK INCLUDES INVESTIGATION OF THE CONTAMINANT SOURCE(S) WITHIN THE M-1 SETTLING BASINS.
JUNE 29, 1989	A FINAL TASK PLAN IS ISSUED BY THE ARMY WITH COMMENTS INCORPORATED.
SEPTEMBER 7, 1989	DRAFT FINAL ALTERNATIVES ASSESSMENT OF INTERIM RESPONSE ACTIONS FOR OTHER CONTAMINATION SOURCES - M-1 SETTLING BASINS AND DRAFT ARARS ARE DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE FOR COMMENT.
SEPTEMBER 11, 1989	FIELD INVESTIGATION COMPLETED.
NOVEMBER 27, 1989	DRAFT FINAL RESULTS OF FIELD AND LABORATORY INVESTIGATIONS CONDUCTED FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES INTERIM RESPONSE ACTION IS

	DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE.
NOVEMBER 27, 1989	FINAL ALTERNATIVES ASSESSMENT OF INTERIM RESPONSE ACTIONS FOR OTHER CONTAMINATION SOURCES - M-1 SETTLING BASINS, IS DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE WITH COMMENTS INCORPORATED.
NOVEMBER 27,1989	PROPOSED DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE M-1 SETTLING BASINS AT THE ROCKY MOUNTAIN ARSENAL IS DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE FOR COMMENT.
DECEMBER 7, 1989	PUBLIC MEETING ON THE PROPOSED DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE M-1 SETTLING BASINS AT THE ROCKY MOUNTAIN ARSENAL.
FEBRUARY 28, 1990	DRAFT FINAL DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE M-I SETTLING BASINS AT THE ROCKY MOUNTAIN ARSENAL IS DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE WITH COMMENTS INCORPORATED.
MARCH 28, 1990	THE DECISION DOCUMENT FOR THE INTERIM RESPONSE ACTION AT THE M-1 SETTLING BASINS AT THE ROCKY MOUNTAIN ARSENAL IS FINALIZED AND DISTRIBUTED BY THE ARMY TO THE ORGANIZATIONS AND THE STATE.

#SIRA
SUMMARY OF THE INTERIM RESPONSE ACTION

PERFORMING IN SITU VITRIFICATION AT THE M-1 SETTLING BASINS IS THE CHOSEN ALTERNATIVE. THIS IS A TECHNICALLY FEASIBLE ALTERNATIVE THAT DESTROYS THE ORGANIC CONTAMINANTS AND PERMANENTLY IMMOBILIZES OR CAPTURES THE METALS PRESENT IN THE M-1 SETTLING BASINS. THIS ALTERNATIVE PROVIDES FOR LONG-TERM EFFECTIVENESS BECAUSE, FOR THE SOILS AND SLUDGES VITRIFIED, IT IS A PERMANENT TREATMENT AND LEAVES NO UNTREATED WASTE OR TOXIC AND MOBILE RESIDUALS ON SITE.

PRIOR TO CONDUCTING THE IN SITU VITRIFICATION OPERATIONS, SEVERAL TANKS CURRENTLY SITUATED OVER THE M-1 SETTLING BASINS WILL BE RELOCATED TO AN ADJACENT AREA OF THE SOUTH PLANTS TO AWAIT A DEMOLITION AND DISPOSAL DETERMINATION IN THE FINAL ONPOST RECORD OF DECISION (ROD). SAMPLING OF THE TANKS MAY BE REQUIRED PRIOR TO THEIR RELOCATION FOR HEALTH AND SAFETY REASONS. THE METHOD AND QUANTITY OF SAMPLING WILL BE DETERMINED DURING THE DESIGN OF THIS IRA.

A TEMPORARY 360-DEGREE SUBSURFACE BARRIER, SUCH AS A SLURRY WALL OR SHEET PILINGS, WILL BE CONSTRUCTED AROUND THE M-1 SETTLING BASINS AND KEYED INTO THE DENVER FORMATION. THIS WILL PROVIDE A TEMPORARY BARRIER TO HYDRAULICALLY ISOLATE THE MATERIAL IN THE BASINS FROM THE SURROUNDING AQUIFER DURING THE IN SITU VITRIFICATION PROCESS. AN IN SITU VITRIFICATION DEMONSTRATION TEST WILL THEN BE PERFORMED ON SITE.

FOLLOWING COMPLETION OF THE DEMONSTRATION TEST, THE SLUDGE WILL THEN BE VITRIFIED IN STAGES BY INTRODUCING AN ELECTRIC CURRENT THROUGH A SQUARE ARRAY OF ELECTRODES (APPROXIMATELY 20 FEET BY 20 FEET SQUARE) SET IN THE SLUDGE. THE ELECTRIC CURRENT WILL RAISE THE TEMPERATURE OF THE SLUDGE AND SURROUNDING SOIL TO APPROXIMATELY 1600 DEGREES CENTIGRADE, FORMING A MELT THAT SUBSEQUENTLY COOLS TO FORM AN IMPERMEABLE GLASS. ANY ORGANICS IN THE SLUDGE ARE EITHER PYROLYZED IN THE MELT OR CAPTURED IN THE OFFGAS

TREATMENT SYSTEM. MOST OF THE ARSENIC AND THE HEAVY METALS WILL BE INCORPORATED INTO THE GLASS. MOST OF THE MERCURY AND SOME OF THE ARSENIC WILL BE VAPORIZED AND SUBSEQUENTLY CONDENSED IN THE OFFGAS TREATMENT SYSTEM. THE VITRIFICATION WILL BE PERFORMED TO A DEPTH AT LEAST TO THE BOTTOM OF THE BASINS. IF THE GROUNDWATER TABLE IS BELOW THE BOTTOM OF THE BASINS, THE MELT MAY EXTEND TO A MAXIMUM DEPTH EQUAL TO THE GROUNDWATER TABLE ELEVATION. THE EXACT DEPTH WILL BE DETERMINED DURING THE DESIGN AND IMPLEMENTATION OF THIS IRA.

THE VITRIFICATION PROCESS WILL BE CONDUCTED UNDER A HOOD THAT WILL BE OPERATED UNDER VACUUM CONDITIONS AND BE DESIGNED WITH REDUNDANCY TO PREVENT ANY RELEASES OF THE OFFGAS TO THE ATMOSPHERE. THE OFFGAS CONTROL SYSTEM WILL COOL, SCRUB, AND FILTER THE VAPORS COLLECTED FROM THE OFFGASSING MELT.

ASSUMING THIS PROCESS DRIVES OFF THE WATER FRACTION OF THE SLUDGE, CONDENSED WATER, WILL BE RECOVERED. THE CONDENSATE WILL HAVE ELEVATED CONCENTRATIONS OF ARSENIC AND MERCURY, AS WELL AS AN ALKALINE PH. THIS WILL REQUIRE TREATMENT TO REDUCE ARSENIC AND MERCURY LEVELS TO ACCEPTABLE DISCHARGE LIMIT. MERCURY MAY BE IN A RECOVERABLE FORM. ACTUAL WASTEWATER TREATMENT WILL BE DETERMINED DURING DESIGN AND MAY BE PERFORMED IN THE CERCLA WASTEWATER TREATMENT SYSTEM.

NONCONDENSED GASES WILL BE ABSORBED IN A PACKED SCRUBBER COLUMN. AS A FINAL STEP IN THE AIR POLLUTION CONTROL SEQUENCE, THE EXHAUST GASES WILL PASS THROUGH AN ACTIVATED CARBON ABSORBER PRIOR TO VENTING TO THE ATMOSPHERE.

AIR MONITORING WILL BE CONDUCTED DURING IMPLEMENTATION OF THIS ALTERNATIVE. A GROUNDWATER MONITORING PROGRAM WILL ALSO BE IMPLEMENTED TO EVALUATE THE CONTINUED EFFECTIVENESS OF THIS ALTERNATIVE.

HEALTH AND SAFETY PLAN

A HEALTH AND SAFETY PLAN HAS BEEN DEVELOPED FOR THE PREVENTION OF OCCUPATIONAL INJURIES AND ILLNESSES DURING FIELD ACTIVITIES AT RMA. THIS PLAN ADDRESSES HEALTH AND SAFETY REQUIREMENTS OF CONTRACTORS AND THEIR AUTHORIZED SUBCONTRACTORS. COMPLIANCE WITH THIS PLAN WILL BE COMPULSORY, AND THE CONTRACTORS WILL RESPONSIBLE FOR SELF-ENFORCEMENT AND COMPLIANCE WITH THIS PLAN. THE HEALTH AND SAFETY PLAN WAS DEVELOPED TAKING INTO CONSIDERATION KNOWN HAZARDS AS WELL AS POTENTIAL RISKS. COMPREHENSIVE ENVIRONMENTAL MONITORING AND SITE-SPECIFIC PERSONAL PROTECTION ARE COMBINED IN AN EFFORT TO BEST PROTECT WORKERS.

A SITE-SPECIFIC HEALTH AND SAFETY PLAN FOR WORK TO BE PERFORMED ON THE M-1 SETTLING BASINS DURING IMPLEMENTATION OF THIS IRA WILL BE DEVELOPED.

#IRAP
INTERIM RESPONSE ACTION PROCESS

WITH RESPECT TO THE INTERIM RESPONSE ACTION (IRA) FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES FOR THE M-1 SETTLING BASINS AT ROCKY MOUNTAIN ARSENAL (RMA), THE IRA PROCESS IS AS FOLLOWS:

1. THE SCOPE OF THE IRA IS DESCRIBED IN THE JUNE 5, 1987 REPORT TO THE COURT OF THE UNITED STATES (THE ARMY AND EPA), SHELL, AND THE STATE IN UNITED STATES VS. SHELL OIL CO. A SIMILAR DESCRIPTION IS INCLUDED IN THE PROPOSED CONSENT DECREE, PARAGRAPH 9.1(L), AND THE FEDERAL FACILITY AGREEMENT (FFA), PARAGRAPH 22-1 (L).

2. THE ORGANIZATIONS AND DOI SHALL HAVE THE OPPORTUNITY TO PARTICIPATE, AT THE RMA COMMITTEE LEVEL, IN THE IDENTIFICATION AND SELECTION OF

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) THAT MAY BE APPLICABLE TO IRAS.

3. THE ARMY ISSUES THE PROPOSED DECISION DOCUMENT FOR THE IRA FOR THE INTERIM REMEDIATION OF OTHER CONTAMINATION SOURCES, M-1 SETTLING BASINS, FOR A 30-DAY PUBLIC COMMENT PERIOD. DURING THE 30-DAY COMMENT PERIOD, THE ARMY WILL HOLD ONE PUBLIC MEETING ADDRESSING THE IRA DECISION. THE PROPOSED DECISION DOCUMENT IS SUPPORTED BY AN ADMINISTRATIVE RECORD.

4. PROMPTLY AFTER THE CLOSE OF THE COMMENT PERIOD, THE ARMY SHALL TRANSMIT TO THE OTHER ORGANIZATION, DEPARTMENT OF INTERIOR (DOI), AND THE STATE, A DRAFT FINAL IRA DECISION DOCUMENT FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES, M-1 SETTLING BASINS,

5. WITHIN 20 DAYS AFTER THE ISSUANCE OF A DRAFT FINAL IRA DECISION DOCUMENT FOR THE INTERIM REMEDIATION OF OTHER CONTAMINATION SOURCES, M-1 SETTLING BASINS, AN ORGANIZATION (INCLUDING THE STATE IF IT HAS AGREE TO BE BOUND BY THE DISPUTE RESOLUTION PROCESS, AS REQUIRED BY THE FFA, OR DOI UNDER THE PROVISIONS SET FORTH IN THE FFA) MAY INVOKE DISPUTE RESOLUTION.

6. AFTER THE CLOSE OF THE PERIOD FOR INVOKING DISPUTE RESOLUTION, IF DISPUTE RESOLUTION IS NOT INVOKED, OR AFTER THE COMPLETION OF DISPUTE RESOLUTION, IF INVOKED, THE ARMY SHALL ISSUE A FINAL IRA DECISION DOCUMENT TO THE OTHER ORGANIZATIONS, DOI, AND THE STATE. THE ARMY SHALL ALSO NOTIFY THE PUBLIC OF THE AVAILABILITY OF THE FINAL IRA DECISION DOCUMENT WITH THE SUPPORTING ADMINISTRATIVE RECORD. ONLY PRELIMINARY DESIGN WORK FOR THE IRA MAY BE CONDUCTED PRIOR TO THE ISSUANCE OF THE FINAL IRA DECISION DOCUMENT.

7. THE IRA DECISION DOCUMENT FOR THE REMEDIATION ACTIVITY AT THE M-1 SETTLING BASINS WILL BE SUBJECT TO JUDICIAL REVIEW IN ACCORDANCE WITH SECTION XXXIX OF THE FEDERAL FACILITY AGREEMENT EXCEPT WHERE SUCH REVIEW IS BARRED BY SECTIONS 113 AND 121 OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT OF 1980 (CERCLA), AS AMENDED, 42 USC SECTIONS 6913 AND 9621.

8. FOLLOWING ISSUANCE OF THE FINAL IRA DECISION DOCUMENT, THE ARMY SHALL BE THE LEAD PARTY RESPONSIBLE FOR DESIGNING AND IMPLEMENTING THE IRA IN CONFORMANCE WITH THE DECISION DOCUMENT. THE ARMY SHALL ISSUE A DRAFT IRA IMPLEMENTATION DOCUMENT TO THE DOI, THE STATE, AND THE OTHER ORGANIZATIONS FOR REVIEW AND COMMENT. THE DRAFT IMPLEMENTATION DOCUMENT SHALL INCLUDE FINAL DRAWINGS AND SPECIFICATIONS, FINAL DESIGN ANALYSIS, A COST ESTIMATE, AND IRA DEADLINES FOR IMPLEMENTATION OF THE IRA.

9. IF ANY ORGANIZATION (INCLUDING THE STATE) OR THE DOI BELIEVES THAT THE IRA IS BEING DESIGNED OR IMPLEMENTED IN A MANNER THAT WILL NOT MEET THE OBJECTIVES FOR THE IRA SET FORTH IN THE FINAL IRA DECISION DOCUMENT, OR IS OTHERWISE NOT BEING PROPERLY IMPLEMENTED, IT MAY SO ADVISE THE OTHERS AND SHALL RECOMMEND HOW THE IRA SHOULD BE PROPERLY DESIGNED OR IMPLEMENTED. ANY ORGANIZATION (INCLUDING THE STATE, IF IT HAS AGREED TO BE BOUND BY THE PROCESS OF DISPUTE RESOLUTION, AS REQUIRED BY THE FFA, OR THE DOI UNDER THE CIRCUMSTANCES DEFINED IN THE FFA) MAY INVOKE DISPUTE RESOLUTION TO RESOLVE THE DISAGREEMENT.

10. AS LEAD PARTY FOR THE DESIGN AND IMPLEMENTATION OF THIS IRA, THE ARMY WILL ISSUE THE FINAL IMPLEMENTATION DOCUMENT, AS DESCRIBED ABOVE, AND WILL BE RESPONSIBLE FOR IMPLEMENTING THE IRA IN ACCORDANCE WITH THE IRA IMPLEMENTATION DOCUMENT.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCE-M-1 SETTLING BASINS INTERIM RESPONSE ACTION.

THESE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) ADDRESS THE M-1 SETTLING BASINS, A SPECIFIC AREA IDENTIFIED FOR REMEDIATION PRIOR TO THE ISSUANCE OF A RECORD OF DECISION (ROD) FOR THE ONPOST OPERABLE UNIT OF THE ROCKY MOUNTS ARSENAL. THE ACTION DESCRIBED IN THIS DOCUMENT IS INTERIM, SUBJECT TO FURTHER REMEDIATION AS IDENTIFIED IN THE ONPOST ROD.

AMBIENT OR CHEMICAL-SPECIFIC ARARS

AMBIENT OR CHEMICAL-SPECIFIC REQUIREMENTS SET CONCENTRATION LIMITS OR RANGES IN VARIOUS ENVIRONMENTAL MEDIA FOR SPECIFIC HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS. SUCH ARARS EITHER SET PROTECTIVE CLEANUP LEVELS FOR THE CHEMICALS OF CONCERN IN THE DESIGNATED MEDIA OR INDICATE AN APPROPRIATE LEVEL OF DISCHARGE BASED ON TECHNOLOGICAL CONSIDERATIONS.

THE OBJECTIVES OF THIS IRA ARE DISCUSSED IN THE FINAL ASSESSMENT DOCUMENT AND FINAL DECISION DOCUMENT. THIS IRA WILL BE IMPLEMENTED PRIOR TO THE FINAL REMEDIATION TO BE UNDERTAKEN IN THE CONTEXT OF THE ONPOST OPERABLE UNIT ROD. THE MEDIA OF CONCERN HERE ARE THE AIR EMISSIONS FROM THE SYSTEM HOOD, THE LIQUID EFFLUENT REMAINING AFTER COMPLETION OF THE OFF-GAS CONTROL PROCESS (SEE SECTION 6.0), ANY LIQUID GENERATED THROUGH DEWATERING OF THE AREA, AND THE SOILS WHICH WILL BE SUBJECT TO THE VITRIFICATION PROCESS. HOWEVER, NO AMBIENT OR CHEMICAL-SPECIFIC ARARS WERE IDENTIFIED CONCERNING LEVELS OF CONTAMINANTS FOR SOILS WHICH HAVE BEEN VITRIFIED. SECTION 8.4 DISCUSSES ACTION-SPECIFIC ARARS FOR THE VITRIFIED MASS THAT REMAINS AFTER TREATMENT. THE LIQUID EFFLUENT AND ANY OTHER LIQUIDS GENERATED ARE TO BE TREATED BY THE CERCLA WASTEWATER TREATMENT SYSTEM UNDER DEVELOPMENT AT THE ARSENAL AND TREATMENT STANDARDS FOR LIQUIDS TREATED BY THAT SYSTEM ARE CONTAINED IN THE FINAL DECISION DOCUMENT FOR THAT IRA. THESE STANDARDS DO NOT BECOME FINAL UNTIL THE COMPLETION OF THE DECISION DOCUMENT PROCESS FOR THAT IRA, WHICH IS CURRENTLY UNDERWAY. THE SELECTED ALTERNATIVE DOES NOT INCLUDE A GROUNDWATER TREATMENT SYSTEM.

AIR EMISSIONS

THE TREATMENT SYSTEM WILL RESULT IN AIR EMISSIONS, WHICH RESULT FROM THE TREATMENT PROCESS. THESE EMISSIONS WILL BE CONTAINED DURING THE TREATMENT PROCESS, BE SUBJECT TO TREATMENT THEMSELVES AND THEN BE RELEASED TO THE ATMOSPHERE AFTER TREATMENT. THE STANDARDS IDENTIFIED BELOW ADDRESS THE EMISSIONS FROM THE EMISSIONS CONTROL SYSTEM WHICH WILL OPERATE AS PART OF THIS IRA TREATMENT SYSTEM.

THE STANDARDS CONTAINED AT 40 CFR PART 50 WERE REVIEWED AND DETERMINED TO BE NEITHER APPLICABLE NOR RELEVANT AND APPROPRIATE TO APPLY IN THE CONTEXT OF THIS IRA. THESE STANDARDS APPLY TO AIR QUALITY CONTROL REGIONS, LARGE AIR MASSES WHICH ARE MARKEDLY DISSIMILAR FROM THE AREA THAT MAY BE AFFECTED BY THE OPERATION OF AN OFF-GAS CONTROL SYSTEM WHICH IS INTENDED TO BE USED FOR TREATMENT BY THIS IRA SYSTEM. THE SPECIFIC COMPOUNDS ADDRESSED BY THESE STANDARDS, SULFUR OXIDES, CARBON MONOXIDE, OZONE, NITROGEN OXIDE AND LEAD ARE NOT ANTICIPATED TO BE CONTAINED IN SIGNIFICANT AMOUNTS IN ANY POTENTIAL AIR EMISSIONS. THESE STANDARDS ARE DEFINED IN TERMS OF MEASUREMENTS IN LARGE AIR MASSES AND NOT GENERALLY APPLIED TO SPECIFIC EMISSIONS SOURCES, SUCH A SMOKESTACKS AND AUTOMOBILE TAILPIPES, BUT TO THE AQCR AS A WHOLE, SO ARE NOT CONSIDERED RELEVANT AND APPROPRIATE TO APPLY TO THE TYPE OF EMISSION SOURCE WHICH IS INTENDED TO BE UTILIZED IN THE CONTEXT OF THIS IRA. OTHER SPECIFIC STANDARDS HAVE BEEN IDENTIFIED AS BEING APPROPRIATE TO APPLY TO THIS IRA TREATMENT SYSTEM AND ARE IDENTIFIED BELOW.

THE STANDARDS CONTAINED AT 40 CFR PARTS 60 AND 61 WERE REVIEWED AND DETERMINED NOT TO BE APPLICABLE TO OPERATIONS CONDUCTED AS PART OF THE TREATMENT BY THIS IRA SYSTEM. THESE STANDARDS APPLY TO SPECIFIC SOURCES

OF THE LISTED POLLUTANT. FOR EXAMPLE, SUBPART E OF 40 CFR PART 61 APPLIES TO SOURCES WHICH PROCESS MERCURY ORE TO RECOVER MERCURY AND OTHER SPECIFIC PROCESS AND THE ARSENIC PROVISIONS OF SUBPARTS O AND P OF THIS PART APPLY TO VERY SPECIFIC PLANTS, SMELTERS OR FACILITIES. SINCE THE OPERATIONS CONTEMPLATED BY THIS IRA TREATMENT SYSTEM ARE EXTREMELY DISSIMILAR FROM THE PROCESSES IDENTIFIED ABOVE AS DESCRIBED IN 40 CFR PART 61, THESE STANDARDS WERE ALSO NOT CONSIDERED TO BE RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA TREATMENT SYSTEM. HOWEVER, SUBPART N OF PART 61 APPLIES TO GLASS MELTING FURNACES WHICH USE COMMERCIAL ARSENIC AS RAW MATERIAL. THE TREATMENT SYSTEM CONTEMPLATED BY THIS IRA IS NEITHER A GLASS MELTING FURNACE NOR USES COMMERCIAL ARSENIC AS RAW MATERIAL, MAKING THIS SUBPART NOT APPLICABLE. THE VITRIFICATION PROCESS DOES RESULT IN THE CREATION OF A GLASS-LIKE MATERIAL IN THE GROUND AND THERE IS A SIGNIFICANT AMOUNT OF ARSENIC IN THE SOIL WHICH WILL UNDERGO VITRIFICATION. THESE CONSIDERATIONS LEAD TO THE DETERMINATION THAT THE ARSENIC EMISSIONS FROM THE VITRIFICATION PROCESS SHOULD BE SUBJECT TO THE EMISSIONS LIMITATIONS CONTAINED IN 40 CFR S61.162(B)(2) AND THIS SECTION IS CONSIDERED RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA. ACCORDINGLY, ARSENIC EMISSIONS WILL BE CONVEYED TO A CONTROL DEVICE AND REDUCED BY AT LEAST 85 PERCENT. SPECIFIC MONITORING AND CONTROL DEVICES TO BE UTILIZED WILL BE DEVELOPED DURING THE DESIGN AND IMPLEMENTATION PROCESS, AS MORE INFORMATION AND TEST DATA IS AVAILABLE.

THE ARMY HAS IDENTIFIED THE STANDARD CONTAINED IN 5 CCR 1007-3, REGULATION 8, AS RELEVANT AND APPROPRIATE TO APPLY TO MERCURY EMISSIONS FROM THE TREATMENT SYSTEM AND A MORE STRINGENT THAN COMPARABLE FEDERAL REQUIREMENTS. THIS REGULATION IS NOT APPLICABLE SINCE THE IRA TREATMENT SYSTEM WILL NOT USE MERCURY, AS DEFINED BY THE REGULATION. MERCURY EMISSIONS WILL NOT EXCEED 2300 GRAMS PER FIVE POUNDS PER DAY, CONSISTENT WITH THIS REQUIREMENT.

THE ARMY HAS IDENTIFIED THE STANDARD FOR PARTICULATE EMISSIONS CONTROLLED IN 40 CFR S264.343 AS RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA TREATMENT SYSTEM. THIS REQUIREMENT IS NOT APPLICABLE SINCE IT APPLIES TO INCINERATORS, WHICH ARE DIFFERENT FROM THE TREATMENT SYSTEM TO BE INSTALLED AS PART OF THIS IRA. HOWEVER, THE PARTICULATE EMISSION STANDARD IS CONSIDERED RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA TREATMENT SYSTEM. ACCORDINGLY, PARTICULATE EMISSIONS FROM THE TREATMENT SYSTEM WILL BE LIMITED TO 0.08 GRAINS PER DRY STANDARD CUBIC FOOT.

THE ARMY INTENDS TO DEVELOP PERFORMANCE STANDARDS FOR THE SYSTEM HOOD DURING THE DESIGN AND IMPLEMENTATION PHASE OF THIS IRA WHEN MORE DATA IS AVAILABLE CONCERNING THE SPECIFIC EQUIPMENT WHICH IS TO BE UTILIZED FOR THIS IRA. THE ARMY WILL COORDINATE THIS ACTION WITH THE OTHER ORGANIZATIONS AND THE STATE.

OTHER STANDARDS FOR TOTAL ORGANIC DESTRUCTION EFFICIENCY AND OPACITY ARE DISCUSSED IN SECTION 8.4, ACTION-SPECIFIC ARARS.

LOCATION-SPECIFIC ARARS

LOCATION-SPECIFIC REQUIREMENTS SET RESTRICTIONS ON ACTIVITIES, DEPENDING ON THE CHARACTERISTICS OF THE SITE OR THE IMMEDIATE ENVIRONMENT, AND FUNCTION LIKE ACTION-SPECIFIC REQUIREMENTS. ALTERNATIVE REMEDIAL ACTIONS MAY BE RESTRICTED OR PRECLUDED, DEPENDING ON THE LOCATION OR CHARACTERISTIC OF THE SITE AND THE REQUIREMENTS THAT APPLY TO IT.

PARAGRAPH 44.2 OF THE FEDERAL FACILITY AGREEMENT PROVIDES THAT "WILDLIFE HABITAT(S) SHALL BE PRESERVED AND MANAGED AS NECESSARY TO PROTECT ENDANGERED SPECIES OF WILDLIFE TO THE EXTENT REQUIRED BY THE ENDANGERED SPECIES ACT (16 USC 1531 ET SEQ.), MIGRATORY BIRDS TO THE EXTENT REQUIRED BY THE MIGRATORY BIRD TREATY ACT (16 USC 703 ET SEQ.), AND BALD EAGLES TO THE EXTENT REQUIRED BY THE BALD EAGLE PROTECTION ACT, 16 USC

688 ET SEQ.".

WHILE THIS PROVISION IS NOT AN ARAR, THE STATUTORY REQUIREMENTS THEMSELVES ARE ARARS, APPLICABLE TO THIS IRA AND WILL BE COMPLIED WITH. BASED ON WHERE THIS TREATMENT SYSTEM IS LIKELY TO BE LOCATED THE ARMY BELIEVES THAT THIS IRA WILL HAVE NO ADVERSE IMPACT ON ANY ENDANGERED SPECIES OR MIGRATORY BIRDS OR ON THE PROTECTION OF WILDLIFE HABITATS. COORDINATION WILL BE MAINTAINED WITH THE US FISH AND WILDLIFE SERVICE TO ENSURE THAT NO SUCH ADVERSE IMPACT ARISES FROM IMPLEMENTATION OF THIS IRA.

THE ARMY CONSIDERS RELEVANT AND APPROPRIATE AND WILL COMPLY WITH 40 CFR 6.302(A) AND (B) CONCERNING THE LOCATION OF THIS TREATMENT SYSTEM, AVOIDING THE CONSTRUCTION OF SUCH SYSTEM IN A MANNER THE WOULD HAVE AN ADVERSE IMPACT ON WETLANDS OR BE WITHIN A FLOOD PLAIN.

THE REGULATIONS AT 40 CFR 230 WERE REVIEWED AND DETERMINED NOT TO BE APPLICABLE WITHIN THE CONTEXT OF THIS IRA BECAUSE NO DISCHARGE OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES IS CONTEMPLATE. BECAUSE THESE REGULATIONS ADDRESS ONLY THE DISPOSAL OF SUCH MATERIALS INTO THE WATERS OF THE UNITED STATES, WHICH IS NOT CONTEMPLATED, THEY ARE NOT CONSIDERED TO BE RELEVANT AND APPROPRIATE TO APPLY IN THE CONTEXT OF THIS IRA.

THE REGULATIONS AT 33 CFR 320-330 WERE REVIEWED AND DETERMINED TO BE NEITHER APPLICABLE NOR RELEVANT AND APPROPRIATE BECAUSE THEY ADDRESS ACTIONS AFFECTING THE WATERS OF THE UNITED STATES. NO SUCH ACTIONS ARE CONTEMPLATED WITHIN THE CONTEXT OF THIS IRA.

ACTION-SPECIFIC ARARS

DESCRIPTION

PERFORMANCE, DESIGN, OR OTHER ACTION-SPECIFIC REQUIREMENTS SET CONTROLS OR RESTRICTIONS ON ACTIVITIES RELATED TO THE MANAGEMENT OF HAZARDOUS SUBSTANCES, POLLUTANTS, OR CONTAMINANTS. THESE ACTION-SPECIFIC REQUIREMENTS MAY SPECIFY PARTICULAR PERFORMANCE LEVELS, ACTIONS, OR TECHNOLOGIES AS WELL AS SPECIFIC LEVELS (OR A METHODOLOGY FOR SETTING SPECIFIC LEVELS) FOR DISCHARGED OR RESIDUAL CHEMICALS.

CONSTRUCTION OF TREATMENT SYSTEM

AIR EMISSION

THE CONSTRUCTION OF AN IN-SITU VITRIFICATION SYSTEM DOES NOT INVOLVE SIGNIFICANT EXCAVATION IN THE AREA ON THE M-1 BASINS, PROVIDING VERY LITTLE POTENTIAL FOR THE GENERATION OF AIR EMISSION DURING CONSTRUCTION. ON THE REMOTE POSSIBILITY THAT THERE MAY BE AIR EMISSIONS DURING THE COURSE OF THE CONSTRUCTION OF THIS TREATMENT SYSTEM, THE ARMY HAS REVIEWED ALL POTENTIAL AMBIENT OR CHEMICAL-SPECIFIC AIR EMISSION REQUIREMENTS. AS A RESULT OF THIS REVIEW, THE ARMY FOUND THAT THERE ARE, AT PRESENT, NO NATIONAL OR STATE AMBIENT AIR QUALITY STANDARDS CURRENTLY APPLICABLE OR RELEVANT AND APPROPRIATE TO ANY OF THE VOLATILE OR SEMIVOLATILES CHEMICALS IN THE GROUND WATER FOUND IN THE AREA IN WHICH CONSTRUCTION IS CONTEMPLATED.

IN THE CONTEXT OF THIS IRA THERE IS ONLY A VERY REMOTE CHANCE OF ANY RELEASE OF VOLATILES OR SEMIVOLATILES AND, EVEN IF SUCH A RELEASE DID OCCUR, IT WOULD ONLY BE INTERMITTENT AND OF VERY BRIEF DURATION (BECAUSE THE ACTIVITY THAT PRODUCED THE RELEASE WOULD BE STOPPED AND MODIFIED APPROPRIATELY IF A SIGNIFICANT AIR EMISSION, BASED UPON SPECIFIC STANDARDS CONTAINED IN THE HEALTH AND SAFETY PLAN, WAS DETECTED BY THE CONTRACTOR'S AIR MONITORING SPECIALIST). THE ARMY HAS SIGNIFICANT EXPERIENCE WITH THE CONSTRUCTION OF SLURRY WALLS, EXTRACTION AND

REINJECTION WELLS, WHICH INVOLVE GREATER EXCAVATION THAN THE CONSTRUCTION OF THE TREATMENT SYSTEM CONTEMPLATED BY THIS IRA AND HAS NOT EXPERIENCED ANY PROBLEM FROM AIR EMISSIONS DURING CONSTRUCTION OF SUCH FACILITIES. THE SITE-SPECIFIC HEALTH AND SAFETY PLAN WILL ADEQUATELY ADDRESS THESE CONCERNS. THIS PLAN TO BE DEVELOPED FOR USE IN THE IRA WILL DETAIL OPERATIONAL MODIFICATIONS TO BE IMPLEMENTED IN THE EVENT MONITORING DETECTS SPECIFIC LEVELS OF SUCH EMISSIONS.

THE NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS) WERE EVALUATED TO DETERMINED WHETHER THEY WERE APPLICABLE OR RELEVANT AND APPROPRIATE TO APPLY IN THE CONTEXT OF CONSTRUCTION OF THIS IRA. THESE STANDARDS WERE NOT CONSIDERED APPLICABLE BECAUSE THEY APPLY TO STATIONARY SOURCES OF THESE POLLUTANTS, NOT TO CONSTRUCTION ACTIVITY. THESE STANDARDS WERE NOT CONSIDERED RELEVANT AND APPROPRIATE BECAUSE THEY WERE DEVELOPED FOR MANUFACTURING PROCESSES, WHICH ARE SIGNIFICANTLY DISSIMILAR TO THE SHORT-TERM CONSTRUCTION ACTIVITY CONTEMPLATED BY THIS IRA.

THE PROVISIONS OF 40 CFR 50.6 WILL BE CONSIDERED RELEVANT AND APPROPRIATE. THIS STANDARD IS NOT APPLICABLE BECAUSE IT ADDRESSES AIR QUALITY CONTROL REGION, WHICH ARE AREAS SIGNIFICANTLY LARGER THAN AND DIFFERENT FROM THE AREA OF CONCERN IN THIS IRA. PURSUANT TO THIS REGULATION, THERE WILL BE NO PARTICULATE MATTER TRANSPORTED BY AIR FROM THE SITE THAT IS IN EXCESS OF 50 MICROGRAMS PER CUBIC METER (ANNUAL GEOMETRIC MEAN) AND THE STANDARD OF 150 MICROGRAMS PER CUBIC METER AS A MAXIMUM 24-HOUR CONCENTRATIONS WILL NOT BE EXCEEDED MORE THAN ONCE PER YEAR.

WORKER PROTECTION

THE PROVISIONS OF 29 CFR 1901.120 ARE APPLICABLE TO WORKERS AT THE SITE BECAUSE THESE PROVISIONS SPECIFICALLY ADDRESS HAZARDOUS SUBSTANCE RESPONSE OPERATIONS UNDER CERCLA. IT SHOULD BE NOTED THAT THESE ACTIVITIES ARE PRESENTLY GOVERNED BY THE INTERIM RULE FOUND AT 29 CFR 1910.120 BUT THAT BY THE TIME IRA ACTIVITY COMMENCES AT THE SITE, THE FINAL RULE FOUND AT 54 FR 9294 (MARCH 6, 1989) WILL BE OPERATIVE. (THE FINAL RULE BECOMES EFFECTIVE ON MARCH 6, 1990).

GENERAL CONSTRUCTION ACTIVITIES

THE FOLLOWING PERFORMANCE, DESIGN, OR OTHER ACTION-SPECIFIC STATE ARARS HAVE BEEN PRELIMINARY IDENTIFIED BY THE ARMY AS APPLICABLE TO THIS PORTION OF THE IRA AND MORE STRINGENT THAN ANY APPLICABLE OR RELEVANT AND APPROPRIATE FEDERAL STANDARD, REQUIREMENT, CRITERION, OR LIMITATION:

COLORADO AIR POLLUTION CONTROL COMMISSION REGULATION NO. 1, 5 CCR 1001-3, PART III(D)(2)(B), CONSTRUCTION ACTIVITIES:

A. APPLICABILITY - ATTAINMENT AND NONATTAINMENT AREAS

B. GENERAL REQUIREMENT - ANY OWNER OR OPERATOR ENDED IN CLEARING OR LEVELING OF LAND OR OWNER OR OPERATOR OF LAND THAT HAS BEEN CLEARED OF GREATER THAN ONE (1) ACRE IN NONATTAINMENT AREAS FOR WHICH FUGITIVE PARTICULATE EMISSIONS WILL BE EMITTED SHALL BE REQUIRED TO USE ALL AVAILABLE AND PRACTICAL METHODS WHICH ARE TECHNOLOGICALLY FEASIBLE AND ECONOMICALLY REASONABLE IN ORDER TO MINIMIZE SUCH EMISSIONS, IN ACCORDANCE WITH THE REQUIREMENTS OF SECTION III.D. OF THIS REGULATION.

C. APPLICABLE EMISSION LIMITATION GUIDELINE - BOTH THE 20 PERCENT OPACITY AND THE NO OFF-PROPERTY TRANSPORT EMISSION LIMITATION GUIDELINES SHALL APPLY TO CONSTRUCTION ACTIVITIES; EXCEPT THAT WITH RESPECT TO SOURCES OR ACTIVITIES ASSOCIATED WITH CONSTRUCTION FOR WHICH THERE ARE SEPARATE REQUIREMENTS SET FORTH IN THIS REGULATION, THE EMISSION LIMITATION GUIDELINES THERE SPECIFIED AS APPLICABLE TO SUCH SOURCES AND ACTIVITIES SHALL BE EVALUATED FOR COMPLIANCE WITH THE REQUIREMENTS OF

SECTION III.D. OF THIS REGULATION, (CROSS REFERENCE: SUBSECTIONS E. AND F. OF SECTION III.D.2 OF THIS REGULATION).

D. CONTROL MEASURES AND OPERATING PROCEDURES - CONTROL MEASURES OR OPERATIONAL PROCEDURES TO BE EMPLOYED MAY INCLUDE BUT ARE NOT NECESSARILY LIMITED TO PLANTING VEGETATION COVER, PROVIDING SYNTHETIC COVER, WATERING, CHEMICAL STABILIZATION, FURRY COMPACTING MINIMIZING DISTURBED AREA IN THE WINTER, WIND BREAKS AND OTHER METHODS OR TECHNIQUES.

COLORADO AMBIENT AIR QUALITY STANDARDS, 5 CCR 1001-14, AIR QUALITY REGULATION A; DIESEL-POWERED VEHICLE EMISSION STANDARDS FOR VISIBLE POLLUTANTS:

A. NO PERSON SHALL EMIT OR CAUSE TO BE EMITTED INTO THE ATMOSPHERE FROM ANY DIESEL-POWERED VEHICLE ANY AIR CONTAMINANT, FOR A PERIOD GREATER THAN 10 CONSECUTIVE SECONDS, WHICH IF OF SUCH A SHADE OR DENSITY AS TO OBSCURE AN OBSERVER'S VISION TO A DEGREE IN EXCESS OF 40 OPACITY, WITH THE EXCEPTION OF SUBPART B BELOW.

B. NO PERSON SHALL EMIT OR CAUSE TO BE EMITTED INTO THE ATMOSPHERE FROM ANY NATURALLY ASPIRATED DIESEL-POWERED VEHICLE OF OVER 8,000 POUNDS GROSS VEHICLE WEIGHT RATING OPERATED ABOVE 7,000 FEET (MEAN SEA LEVEL), ANY AIR CONTAMINANT FOR A PERIOD OF 10 CONSECUTIVE SECONDS, WHICH IS OF A SHADE OR DENSITY AS TO OBSCURE AN OBSERVER'S VISION TO A DEGREE IN EXCESS OF 50 PERCENT OPACITY.

C. DIESEL-POWERED VEHICLES EXCEEDING THESE REQUIREMENTS SHALL BE EXEMPT FOR A PERIOD OF 10 MINUTES, IF THE EMISSIONS ARE A DIRECT RESULT OF A COLD ENGINE START-UP AND PROVIDED THE VEHICLE IS IN A STATIONARY POSITION

D. THIS STANDARD SHALL APPLY TO MOTOR VEHICLES INTENDED, DESIGNED, AND MANUFACTURED PRIMARILY FOR USE IN CARRYING PASSENGERS OR CARGO ON ROADS, STREETS, AND HIGHWAYS.

COLORADO NOISE ABATEMENT STATUTE, CRS SECTION 25-12-103:

A. EACH ACTIVITY TO WHICH THIS ARTICLE IS APPLICABLE SHALL BE CONDUCTED IN A MANNER SO THAT ANY NOISE PRODUCED IS NOT OBJECTIONABLE DUE TO INTERMITTENCE, BEAT FREQUENCY, OR SHRILLNESS.

SOUND LEVELS OF NOISE RADIATING FROM A PROPERTY LINE AT A DISTANCE OF TWENTY-FIVE FEET OR MORE THERE FROM IN EXCESS OF THE DB(A) ESTABLISHED FOR THE FOLLOWING TIME PERIODS AND ZONES SHALL CONSTITUTE PRIMA FACIE EVIDENCE THAT SUCH NOISE IS A PUBLIC NUISANCE:

ZONE	7:00 AM TO NEXT 7:00 PM	7:00 PM TO NEXT 7:00 AM
RESIDENTIAL	55 DB(A)	50 DB(A)
COMMERCIAL	60 DB(A)	55 DB(A)
LIGHT INDUSTRIAL	70 DB(A)	65 DB(A)
INDUSTRIAL	80 DB(A)	75 DB(A)

B. IN THE HOURS BETWEEN 7:00 AM. AND THE NEXT 7:00 PM THE NOISE LEVEL PERMITTED IN SUBSECTION (1) OF THIS SECTION MAY BE INCREASED BY TEN DB(A) FOR A PERIOD OF NOT TO EXCEED FIFTEEN MINUTES IN ANY ONE-HOUR PERIOD.

C. PERIODIC, IMPULSIVE, OR SHRILL NOISES SHALL BE CONSIDERED A PUBLIC NUISANCE WHEN SUCH NOISES ARE AT A SOUND LEVEL OF FIVE DB(A) LESS THAN

THOSE LISTED IN SUBPART (A) OF THIS SECTION.

D. CONSTRUCTION PROJECTS SHALL BE SUBJECT TO THE MAXIMUM PERMISSIBLE NOISE LEVELS SPECIFIED FOR INDUSTRIAL ZONES FOR THE PERIOD WITHIN WHICH CONSTRUCTION IS TO BE COMPLETED PURSUANT TO ANY APPLICABLE CONSTRUCTION PERMIT ISSUED BY PROPER AUTHORITY OR, IF NO TIME LIMITATION IS IMPOSED, FOR A REASONABLE PERIOD OF TIME FOR COMPLETION OF THE PROJECT.

E. FOR THE PURPOSE OF THIS ARTICLE, MEASUREMENTS WITH SOUND LEVEL METERS SHALL BE MADE WHEN THE WIND VELOCITY AT THE TIME AND PLACE OF SUCH MEASUREMENT IS NOT MORE THAN FIVE MILES PER HOUR.

F. IN ALL SOUND LEVEL MEASUREMENTS, CONSIDERATION SHALL BE GIVEN TO THE EFFECT OF THE AMBIENT NOISE LEVEL CREATED BY THE ENCOMPASSING NOISE OF THE ENVIRONMENT FROM ALL SOURCES AT THE TIME AND PLACE OF SUCH SOUND LEVEL MEASUREMENTS.

IN SUBSTANTIVE FULFILLMENT OF COLORADO AIR POLLUTION CONTROL COMMISSION REGULATION NO. 1, THIS IRA WILL EMPLOY THE SPECIFIED METHODS FOR MINIMIZING EMISSION FROM FUEL BURNING EQUIPMENT AND CONSTRUCTION ACTIVITIES. IN SUBSTANTIVE FULFILLMENT OF COLORADO'S DIESEL-POWERED VEHICLE EMISSION STANDARDS, NO DIESEL MOTOR VEHICLES DATED WITH THE CONSTRUCTION SHALL BE OPERATED IN MANNER THAT WILL PRODUCE EMISSIONS IN EXCESS OF THOSE SPECIFIED IN THESE STANDARDS.

THE NOISE LEVELS PERTINENT FOR CONSTRUCTION ACTIVITY PROVIDED IN CRS SECTION 25-12-103 WILL BE ATTAINED IN ACCORDANCE WITH THIS APPLICABLE COLORADO STATUTE.

WETLANDS IMPLICATIONS

THROUGH ESTIMATION OF THE GENERAL AREA WHERE ANY SYSTEM WOULD BE LOCATED, THE ARMY DOES NOT BELIEVE THAT ANY WETLANDS COULD BE ADVERSELY AFFECTS. HOWEVER, UNTIL A FINAL DESIGN IS SELECTED AND A FINAL SITING DECISION MADE, IT CANNOT BE DEFINITIVELY DETERMINED THAT NO IMPACT ON WETLANDS WILL OCCUR. IF THE FINAL SITE SELECTION AND/OR DESIGN RESULT IN AN IMPACT ON WETLANDS, THE ARMY WILL REVIEW THE REGULATORY PROVISIONS CONCERNING WETLANDS IMPACT AND OTHER APPROPRIATE GUIDANCE, AND WILL PROCEED IN A MANNER CONSISTENT WITH THOSE PROVISIONS. COORDINATION WILL BE MAINTAINED WITH THE US FISH AND WILDLIFE SERVICE CONCERNING ANY POTENTIAL IMPACTS ON WETLANDS.

LAND DISPOSAL RESTRICTIONS AND REMOVAL OF SOIL AND DEBRIS

THERE ARE NO ACTION-SPECIFIC ARARS THAT PERTAIN TO THE EXCAVATION OF SOIL DURING THE CONSTRUCTION OF THIS TREATMENT SYSTEM WHICH CAN BE SPECIFICALLY IDENTIFIED AT THIS TIME. IN ANY EVENT, VERY LITTLE SUCH ACTIVITY IS CONTEMPLATED BY THIS IRA.

EPA IS CURRENTLY DEVELOPING GUIDANCE CONCERNING THE LAND DISPOSAL RESTRICTIONS (LDR). WHILE GUIDANCE IS LIMITED, THE ARMY HAS NOT, AT THIS TIME, MADE A DETERMINATION THAT ANY MATERIALS SUBJECT TO LDR WILL BE PRESENT IN THE INFLUENT TREATED OR SOIL REMOVED BY THIS IRA. MORE LISTINGS ARE SCHEDULED TO BE COMPLETED PRIOR TO THE IMPLEMENTATION OF THIS IRA AND THE ARMY WILL REVIEW THESE AS THEY ARE RELEASED. IF IT IS DETERMINED THAT A RESTRICTED DISPOSAL WASTE IS PRESENT, THE ARMY WILL ACT IN A MANNER CONSISTENT WITH EPA GUIDANCE THEN IN EFFECT FOR THE MANAGEMENT OF SUCH WITHIN THE CONTEXT OF CERCLA ACTIONS.

SOIL REMOVAL FROM THE AREA WILL BE PERFORMED IN ACCORDANCE WITH THE PROCEDURES SET FORTH IN THE TASK NO. 32 TECHNICAL PLAN, SAMPLING WASTE HANDLING (NOVEMBER 1987), AND EPA'S JULY 12, 1985, MEMORANDUM REGARDING "EPA REGION VIII PROCEDURE FOR HANDLING OF MATERIALS FROM DRILLING

TRENCH EXCAVATION AND DECONTAMINATION DURING CERCLA RI/FS OPERATIONS AT THE ROCKY MOUNTAIN ARSENAL." WHILE NOT AN ARAR, EPA'S JULY 12, 1985 GUIDANCE MEMORANDUM APPLIES TO THIS ACTION AS A TBA. SOILS GENERATED BY EXCAVATION DURING THE COURSE OF THIS IRA, EITHER AT SURFACE OR SUBSURFACE, MAY BE RETURNED TO THE LOCATION FROM WHICH THEY ORIGINATED (I.E LAST OUT, FIRST IN). ANY MATERIALS REMAINING AFTER COMPLETION OF BACKFILLING THAT ARE SUSPECTED OF BEING CONTAMINATED (BASED ON FIELD SCREENING TECHNIQUES) WILL BE PROPERLY STORED, SAMPLED, ANALYZED, AND ULTIMATELY DISPOSAL AS CERCLA HAZARDOUS WASTES, AS APPROPRIATE.

HAZARDOUS WASTE RESULTING FROM CONSTRUCTION ACTIVITIES WILL BE MANAGED IN ACCORDANCE WITH SUBSTANTIVE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) PROVISIONS. THESE SUBSTANTIVE PROVISIONS INCLUDE BUT ARE NOT LIMITED TO: 40 CFR PART 262 (SUBPART C, PRE-TRANSPORT REQUIREMENTS), 40 CFR PART 263 (TRANSPORTER STANDARDS), 40 CFR PART 264 (SUBPART I, CONTAINER STORAGE AND SUBPART I, WASTE PILES) AND ANY MORE STRINGENT SUBSTANTIVE PROVISIONS OF COMPARABLE STATE REGULATIONS CONTAINED IN 6 CCR 1007-3. THE SPECIFIC SUBSTANTIVE STANDARDS APPLIED WILL BE DETERMINED BY THE FACTUAL CIRCUMSTANCES OF THE ACCUMULATION, STORAGE OR DISPOSAL TECHNIQUES ACTUALLY APPLIED TO ANY SUCH MATERIAL.

AS PART OF THIS IRA, SOME STRUCTURES AND REMAINS OF STRUCTURES WILL BE REMOVED, RESULTING IN DEBRIS. THE ARMY WILL ANALYZE THIS MATERIAL TO DETERMINE WHETHER IT IS HAZARDOUS OR SUBJECT TO ANY RESTRICTIONS CONCERNING DISPOSAL. IN MANAGING AND DISPOSING OF THIS MATERIAL, THE ARMY WILL ACT CONSISTENT WITH THE EPA GUIDANCE THEN IN EFFECT CONCERNING SUCH MATERIAL GENERATED ON CERCLA SITES. MATERIAL DETERMINED TO BE HAZARDOUS WILL BE MANAGED AND DISPOSAL OF AS DISCUSSED ABOVE.

OPERATION OF TREATMENT SYSTEM

AS DESCRIBED IN SECTION 6.0 OF THIS DOCUMENT, THE PROPOSED TREATMENT SYSTEM WILL PROVIDE SIGNIFICANT AIR POLLUTION CONTROLS INCLUDING A PACKED SCRUBBER COLUMN AND ACTIVATED CARBON ADSORBER.

THE ARMY HAS IDENTIFIED THE REQUIREMENTS OF 40 CFR 264-343 CONCERNING THE REMOVAL OF ORGANICS AS RELEVANT AND APPROPRIATE TO APPLY AS A PERFORMANCE STANDARD FOR THIS IRA SYSTEM. THIS REQUIREMENT IS NOT APPLICABLE BECAUSE IT SPECIFICALLY APPLIES ONLY TO INCINERATORS. IN SUBSTANTIVE FULFILLMENT OF THIS REQUIREMENT, THE IRA TREATMENT SYSTEM WILL BE CONSTRUCTED TO PROVIDE 99 PERCENT DESTRUCTION AND REMOVAL OF ORGANICS, AS CALCULATED FROM THE TOTAL IN THE SOIL BEFORE TREATMENT THROUGH THE VENTING OF TREATED AIR TO THE ATMOSPHERE. THE COMPLETE PROCESS WILL BE DESIGNED TO ATTAIN THIS REQUIREMENT.

THE REGULATIONS CONTAINED IN 40 CFR PARTS 60 AND 61, AND THE COMPARABLE STATE REGULATIONS WERE REVIEWED TO DETERMINE WHETHER ANY ACTION-SPECIFIC REQUIREMENTS WERE EITHER APPLICABLE OR RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA TREATMENT SYSTEM. CHEMICAL-SPECIFIC DETERMINATIONS ARE DISCUSSED IN SECTION 8.2 ABOVE. THE PROCESSES DISCUSSED IN THOSE REGULATIONS WERE NOT CONSIDERED SUFFICIENTLY SIMILAR TO THE IN SITU VITRIFICATION PROCESS TO MAKE ANY ACTION-SPECIFIC PROVISION RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA. FOR EXAMPLE, SUBPARTS F, I, NA AND OOO OF PART 61 WERE RECOMMENDED FOR REVIEW BY EPA IN THEIR COMMENTS ON THE PROPOSED DECISION DOCUMENT. THESE SUBPARTS WERE REVIEWED AND FOUND TO ADDRESS VERY SPECIFIC PROCESSES AND TO CONTAIN VARYING STANDARDS, INDICATING THAT THE STANDARDS WERE DEVELOPED SPECIFICALLY FOR THE PROCESSES IDENTIFIED AND WERE NOT APPROPRIATE TO APPLY TO OTHER PROCESSES WHICH ARE NOT EXTREMELY SIMILAR TO THE IDENTIFIED PROCESS. THE PRIMARY FOCUS OF THESE PROVISIONS IS ON PARTICULATE EMISSIONS AND OPACITY. THE ARMY HAS IDENTIFIED A PARTICULATE EMISSION STANDARD FOR THIS IRA OF 0.08 GRAMS PER DRY STANDARD CUBIC FOOT BASED ON THE INCINERATION STANDARD, AS NOTED IN SECTION 8-2 ABOVE. THE ARMY

CONSIDERS THE OPACITY STANDARD CONTAINED IN COLORADO AIR POLLUTION CONTROL REGULATION NO. 1, SECTION II, AS RELEVANT AND APPROPRIATE TO APPLY TO THIS IRA. ACCORDINGLY, THE EMISSIONS FROM THIS IRA TREATMENT SYSTEM WILL NOT EXCEED 20 PERCENT OPACITY.

MANAGEMENT OF VITRIFIED SOIL

THE VITRIFIED SOIL WILL REMAIN, PENDING DETERMINATION OF FINAL REMEDIAL ACTION IN THE ROD FOR THE ON POST OPERABLE UNTIL. DURING THIS PERIOD, THE EXTENSIVE ENDANGERMENT ASSESSMENT AND FEASIBILITY STUDY PROCESSES UNDERWAY FOR THE ON POST OPERABLE UNIT WILL BE USED TO EVALUATE THE NEED FOR AND TYPE OF FURTHER ACTION APPROPRIATE FOR THE VITRIFIED SOIL. THESE PROCESSES WILL ADDRESS MOST OF THE MATTERS CONTAINED IN 40 CFR, PART 264, SUBPART X. THE ARMY WILL COMPLY WITH THE SUBSTANTIVE REQUIREMENTS OF 40 CFR SS264.15, 264.33, 264.75 AND 264.77 DURING THE PERIOD OF MANAGEMENT OF THE VITRIFIED SOIL WHILE FINAL REMEDIAL ACTION IS UNDERGOING DEVELOPMENT.

THE ARMY WILL COMPLY WITH THE SUBSTANTIVE REQUIREMENTS OF 40 CFR S264.97 IN CONDUCTING GROUNDWATER MONITORING IN THE AREA OF THE M-1 SETTLING BASINS IN ORDER TO MONITOR THE EFFECTIVENESS OF THE VITRIFICATION PROCESS AND DETERMINE ANY IMPACTS ON AREA GROUNDWATER FROM THE VITRIFIED MASS.

SOIL TREATMENT AND DISPOSAL

THESE PROPOSED REMEDIAL ACTIONS DO NOT INCLUDE THE POSSIBILITY FOR ONSITE OR OFFSITE DISPOSAL OF SOILS, DEBRIS CONTAMINATED MATERIAL EXCAVATED PURSUANT TO THIS IRA, EXCEPT THOSE THAT MAY BE GENERATED FROM THE CONSTRUCTION ACTIVITIES DISCUSSED ABOVE.

COMPLIANCE WITH THE OTHER ENVIRONMENTAL LAWS

AS IS EVIDENT FROM THE VARIOUS PORTIONS OF THIS DOCUMENT, THIS IRA WAS PREPARED IN SUBSTANTIVE COMPLIANCE WITH 40 CFR 1502.16 (THE REGULATIONS IMPLEMENTING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969).

#SCH
SCHEDULE

THE DRAFT IMPLEMENTATION DOCUMENT IS SCHEDULED FOR COMPLETION ON 28 DECEMBER 1990. THE CONSTRUCTION SCHEDULE WILL BE CONTAINED IN THE DRAFT IMPLEMENTATION DOCUMENT FOR THIS INTERIM RESPONSE ACTION (IRA). THIS MILESTONE HAS BEEN DEVELOPED BASED UPON THE FINAL ASSESSMENT DOCUMENT AND THE ASSUMPTION THAT NO DISPUTE RESOLUTION WILL OCCUR. IF EVENTS THAT NECESSITATE A SCHEDULE CHANGE OR EXTENSION OCCUR, THE CHANGE WILL BE INCORPORATED IN ACCORDANCE WITH THE FEDERAL FACILITY AGREEMENT.

CONSISTENCY WITH THE FINAL REMEDIAL ACTION

THE FEDERAL FACILITY AGREEMENT STATES THAT ALL INTERIM RESPONSE ACTIONS (IRAS) SHALL "TO THE MAXIMUM EXTENT PRACTICABLE, BE CONSISTENT WITH AND CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF FINAL RESPONSE ACTIONS" (PARAGRAPH 22.5).

THE ALTERNATIVES ASSESSMENT CRITERIA (WCC 1989) WERE USED TO EVALUATE THE ALTERNATIVES. THE SELECTED ALTERNATIVE, BY PROVIDING SIGNIFICANT INTERIM REMEDIATION OF A SOURCE OF CONTAMINATION, WILL BE CONSISTENT WITH ANY FINAL RESPONSE ACTION.

#RS

RESPONSIVENESS SUMMARY

RESPONSE TO COMMENTS FROM THE EPA ON THE PROPOSED DECISION DOCUMENT FOR THE M-1 SETTLING BASINS, NOVEMBER 1989

COMMENT 1: THE GROUNDWATER ELEVATION HAS BEEN ESTIMATED ON FIGURE 2-2, YET THE SATURATED THICKNESS OF ALLUVIUM WITH SEASONAL VARIATIONS, WHICH AFFECTS SEVERAL ALTERNATIVE ACTIONS, IS NOT DISCUSSED.

RESPONSE: THE TEXT HAS BEEN REVISED TO DISCUSS THIS POINT (SECTION 2.0). FIGURE 2-2 HAS BEEN REVISED. THE GROUNDWATER ELEVATIONS HAVE BEEN REMOVED SINCE THEY ARE NOT RELEVANT TO THE LOCATION MAP.

COMMENT 2: THE SUBSURFACE BARRIER FOR THE "SLURRY WALL AND CAP" ALTERNATIVE WOULD EXTEND ABOUT FIVE FEET INTO THE DENVER FORMATION; WHEREAS, THE SLURRY WALL FOR THE IN SITU VITRIFICATION (ISV) WOULD EXTEND ONLY TWO FEET INTO THE DENVER FORMATION. THIS DIFFERENCE SHOULD BE EXPLAINED.

RESPONSE: THE SUBSURFACE BARRIER FOR IN SITU VITRIFICATION IS INTENDED TO SERVE ONLY AS A TEMPORARY HYDRAULIC BARRIER DURING THE ISV PROCESS, RATHER THAN AS A CONTAMINANT CONTAINMENT SYSTEM. THE PROPOSED DECISION DOCUMENT STATED THAT THE SUBSURFACE BARRIER WOULD BE CONSTRUCTED TO 15 FEET BELOW GROUND SURFACE. HOWEVER, BECAUSE OF COMMENTS FROM THE EPA AND THE STATE, THE ARMY HAS AGREED TO CONSTRUCT THE SUBSURFACE BARRIER FOR THE ISV ALTERNATIVE TO BE KEYED INTO THE DENVER FORMATION. THE CONTACT BETWEEN THE DENVER FORMATION AND THE ALLUVIUM IS BETWEEN 11 AND 19 FEET BELOW GROUND SURFACE IN THIS AREA. EXACT INSTALLATION DEPTH FOR THE SUBSURFACE BARRIER WILL BE DETERMINED DURING DESIGN.

COMMENT 3: SECTION 4.9, CONCLUSIONS, THE TEST DOES NOT MENTION THE REQUIREMENT FOR A SLURRY WALL FOR THE IN-SITU VITRIFICATION ALTERNATIVE. SECTION 4.6, IN-SITU VITRIFICATION, AND SECTION 6.5, SUMMARY OF THE INTERIM RESPONSE ACTION, DO NOT DISCUSS THE REASONS FOR A SLURRY WALL. THE SLURRY WALL HAS AT LEAST TWO BENEFITS, WHICH SHOULD BE MENTIONED IN THE TEXT: 1) IT PROVIDES A BARRIER FOR DEWATERING THE MASS TO BE VITRIFIED (DEWATERING IS USUALLY LESS EXPENSIVE THAN REMOVING THE WATER AS STREAM DURING VITRIFICATION) AND 2) IT PROVIDES A LONG TERM BARRIER AGAINST LEACHING OF CONTAMINANTS AWAY FROM THE VITRIFIED MASS.

RESPONSE: SUB-SECTION 4.6 AND SECTION 6.0 BOTH DISCUSS THE FACT THAT THE SUBSURFACE BARRIER IS CONSTRUCTED TO TEMPORARY HYDRAULIC BARRIER TO ISOLATE THE SITE FROM THE SURROUNDING AQUIFER. SUBSECTION 4.9 DISCUSSES THE REASONS ISV IS THE PREFERRED ALTERNATIVE AND DOES NOT ADDRESS SPECIFIC IMPLEMENTATION STEPS FOR THIS ALTERNATIVE.

DEWATERING IS NOT ANTICIPATED TO BE NECESSARY FOR THIS ALTERNATIVE. THE VITRIFICATION PRODUCES AN INERT GLASS. IT IS NOT NECESSARY TO PROVIDE A LONG-TERM BARRIER BECAUSE CONTAMINANTS WILL NOT LEACH FROM THIS GLASS. A TOXIC CHARACTERISTIC LEACH PROCEDURE (TCLP) TEST WAS PERFORMED ON THE VITRIFIED USING THE GRIND AND SIEVE METHOD RATHER THAN THE MONOLITH METHOD. THE GLASS PASSED THE TCLP TEST FOR BOTH ARSENIC AND MERCURY, WHICH ARE THE MORE DIFFICULT METALS TO IMMOBILIZE (GEOSAFE CORP. 1989).

COMMENT 4: THE COST OF MELTING A UNIT WEIGHT OF SOIL IS APPROXIMATELY EQUAL TO THE COST OF REMOVING THE SAME WEIGHT OF WATER AS STEAM; THEREFORE, THE INSTALLATION OF THE SLURRY WALL IN COMBINATION WITH DEWATERING WELLS, POSSIBLY WITH SOME BLIND WELLS OR "WICKS" THROUGH THE SLUDGE MAY BE THE MOST ECONOMICAL DESIGN. IF DEWATERING IS USED, WATER WILL REQUIRE TREATMENT; HOWEVER, IF THE SLURRY TRENCH IS PROPERLY INSTALLED AND KEYED ADEQUATELY INTO THE DENVER FORMATION, THE WATER REQUIRING TREATMENT WILL BE MINIMIZED. THE DEWATERING OPTION SHOULD BE CAREFULLY EVALUATED BEFORE RELEASE OF THE DRAFT FINAL DECISION DOCUMENT,

ESPECIALLY SINCE THE DEPTH OF CONTAMINATION EXTENDS INTO THE SATURATED ZONE.

RESPONSE: THE MELT WILL BE MAINTAINED TO A MINIMUM DEPTH EQUAL TO THE

BOTTOM OF THE SLUDGE MATERIAL. IF THE GROUNDWATER TABLE EXISTS BELOW THE BOTTOM OF THE SLUDGE MATERIAL DURING OPERATION, THE MELT MAY BE ALLOWED TO EXTENT TO A MAXIMUM DEPTH EQUAL TO THE GROUNDWATER TABLE ELEVATION. THE ARMY DOES NOT INTEND TO ATTEMPT TO VITRIFY SATURATED SOILS BENEATH THE M-1 SETTLING BASINS, NOR DOES IT INTEND TO DEWATER THE AQUIFER FOR PURPOSES OF VITRIFYING SOILS BENEATH THE M-1 SETTLING BASINS. THE EXACT DEPTH OF THE MELT WILL BE DETERMINED DURING THE DESIGN AND IMPLEMENTATION OF THIS IRA.

COMMENT 5: FINAL DESIGN OF ANY SLURRY TRENCH AT THIS SITE SHOULD BE BASED ON A FEW ADDITIONAL GEOTECHNICAL BORINGS WITH CONTINUOUS SAMPLING ACROSS THE DENVER FORMATION CONTACT IN COMBINATION WITH CONE PENETRATION TESTS (CORRELATED TO THE BORINGS) ALONG THE ALIGNMENT OF THE WALL TO ACCURATELY ESTABLISH THE PENETRATION REQUIREMENTS OF THE SLURRY WALL INTO THE DENVER FORMATION.

RESPONSE: THESE RECOMMENDATIONS WILL BE CONSIDERED DURING THE DESIGN OF THIS IRA.

COMMENT 6: THE DECISION DOCUMENT DOES NOT SPECIFY THE DEPTH TO WHICH THE M-1 SETTLING BASIS WILL BE VITRIFIED UNDER THE PREFERRED ALTERNATIVE. THE DECISION DOCUMENT NEEDS TO SPECIFY THAT VITRIFICATION WILL BE PERFORMED TO A DEPTH BELOW THE DEPTH OF KNOWN CONTAMINATION. IF ALL THE CONTAMINANTS WERE NOT VITRIFIED, THE RESULTS WOULD BE A GLASS CAP OVER THE CONTAMINATED SOILS, WHICH IS NOT ACCEPTABLE SINCE IT WOULD NOT BE CONSISTENT WITH A FINAL CLEANUP REMEDY, SINCE IT WOULD LEAVE A CONTINUED SOURCE OF CONTAMINATION BASICALLY INACCESSIBLE TO FURTHER REMEDIATION. A SOUND SCENARIO MUST BE DEVELOPED TO ENSURE THE SOURCE OF CONTAMINANTS WILL BE REMEDIATED.

RESPONSE: THE TEXT HAS BEEN REVISED TO SPECIFY THAT VITRIFICATION WILL BE PERFORMED AT LEAST TO THE BOTTOM OF THE BASINS. IF THE GROUNDWATER TABLE IS BELOW THE BOTTOM OF THE BASINS, THE MELT MAY EXTEND TO A MAXIMUM DEPTH EQUAL TO THE GROUNDWATER TABLE ELEVATION. THE EXACT DEPTH WILL BE DETERMINED DURING THE DESIGN AND IMPLEMENTATION OF THIS IRA.

COMMENT 7: THE PREFERRED ALTERNATIVE OF IN-SITU VITRIFICATION HAS ASPECTS WHICH ARE SIMILAR TO INCINERATION ALTERNATIVES. AS SUCH, THE DECISION DOCUMENT NEEDS TO SPECIFY THE ACTIONS TO BE TAKEN TO PREVENT EMISSIONS OF ORGANICS OR METALS TO THE ATMOSPHERE. THE DECISION DOCUMENT SHOULD SPECIFY THE DESTRUCTION AND REMOVAL EFFICIENCIES TO BE ACHIEVED DURING THE IMPLEMENTATION OF THE PREFERRED ALTERNATIVE.

THE QUANTITY OF MERCURY THAT MAY BE EMITTED FROM THE SLUDGE COULD BE AS GREAT AS 40 TONS, ALTHOUGH THAT REPRESENTS LESS THAN 0.5 PERCENT OF THE SLUDGE MASS (PAGE 2-17 OF THE ALTERNATIVES ASSESSMENT). THE DECISION DOCUMENT SHOULD ADDRESS THE VAPORIZATION AND CONDENSATION OF AVAILABLE MERCURY AND ARSENIC (THERE IS APPARENTLY 700 TONS OF ARSENIC IN THE SLUDGE), WHETHER OR NOT THE EXISTING-DESIGN OFFGAS CONTROL SYSTEM CAN HANDLE THE ESTIMATED QUANTITIES AND WHETHER OR NOT ESTIMATED QUANTITIES SHOULD BE CONSIDERED "TRACES" (ON PAGE 6-1, THIRD PARAGRAPH, THE TEXT DESCRIBES THEM AS "TRACE CONTAMINANTS," WHILE THE FOURTH PARAGRAPH SAYS THEY WILL BE "ELEVATED").

THERE SHOULD BE EXTENSIVE INFORMATION AND OPERATING REQUIREMENTS ON THE HOOD PERFORMANCE SPECIFIED TO ENSURE THAT THE CONTAMINANTS ARE CAPTURED THROUGH THE SYSTEM AND DO NOT ESCAPE FROM AROUND THE HOOD, ETC. THE PERFORMANCE OF THE HOOD SHOULD BE ANALYZED FOR THE ABILITY TO COMPLY WITH OPACITY, VOCS, NESHAPS, ETC. ARARS. THERE SHOULD BE A RISK

ANALYSIS PERFORMED REGARDING ANY ESCAPING CONTAMINANTS FROM THE HOOD AND THE AIR POLLUTION CONTROL DEVICES SO HEALTH-BASED EMISSIONS LIMITS CAN BE DERIVED (SEE SPECIFIC ARARS COMMENTS BELOW.)

RESPONSE: THE ARMY AGREES THAT THESE ISSUES ARE IMPORTANT AND WILL NEED TO BE ADDRESSED DURING THE DESIGN PHASE OF THIS IRA. HOWEVER, THESE ISSUES DO NOT PRECLUDE THE SELECTION OF ISV AS THE PREFERRED ALTERNATIVE AT THE SITE.

A RISK ANALYSIS FOR THE PROCESSES INVOLVED IN THIS IRA WILL BE PERFORMED.

COMMENT 8: THE PROPOSED SITE REMEDY, IN-SITU VITRIFICATION, IS LIKELY TO BE AT LEAST A SIGNIFICANT PART OF THE PERMANENT REMEDY FOR THE M-1 SETTLING BASINS THEMSELVES (BUT NOT THE RESULTING PLUME). THE PUBLIC SHOULD BE MADE AWARE OF THAT. THIS IS A SOURCE DESTRUCTION AND IMMOBILIZATION ALTERNATIVE WHICH DOES NOT ADDRESS THE EXISTING PLUME, BUT IF EMPLOYED WOULD REDUCE THE POTENTIAL OF FURTHER GROUNDWATER IMPACTS.

RESPONSE: ISV WILL RESULT IN DESTROYING THE CONTAMINANTS IN THE M-1 SETTLING BASINS OR PERMANENTLY IMMOBILIZING CONTAMINANTS IN AN INERT GLASS. THE FINAL ONPOST RECORD OF DECISION (ROD) WILL DETERMINE WHETHER THIS INERT GLASS CAN BE LEFT IN PLACE AND CONSIDERED A FINAL REMEDY FOR THE M-1 SETTLING BASINS, OR WHETHER SOME ADDITIONAL ACTION IS REQUIRED. GROUNDWATER CONTAMINATION WILL BE ADDRESSED IN THE FINAL ROD.

COMMENT 9: THE FINAL RECORD OF DECISION WILL HAVE TO ADDRESS THE ARMY'S PLANS FOR THE VITRIFIED MASS AFTER COMPLETION OF THE ACTION.

RESPONSE: AGREED.

COMMENT 10: THE DECISION DOCUMENT NEEDS TO ESTABLISH TO A COMPREHENSIVE MONITORING PROGRAM FOR BOTH AIR AND GROUNDWATER EMISSIONS, THE OBJECTIVES OF WHICH INCLUDE THE FOLLOWING:

* WHAT LONG-TERM RESTRICTIONS (INSTITUTIONAL CONTROLS) MAY HAVE TO BE PLACED ON THE VITRIFIED MASS;

* WHETHER THE IRA ACTION IS INDEED A FINAL ACTION;

* WHETHER THE IRA IS OPERATING SUCCESSFULLY;

* WHETHER THERE IS ANY CHANGE OR IMPACT TO REGIONAL GROUNDWATER FLOW.

SUCH ISSUES WILL HAVE TO BE DECIDED IN THE FINAL RECORD OF DECISION AND REVISITED DURING THE MANDATORY POST-ROD FIVE-YEAR REVIEWS, AS WELL.

RESPONSE: THE GROUNDWATER AND AIR MONITORING PROGRAM WILL BE ESTABLISHED DURING THE DESIGN OF THIS IRA. THE OBJECTIVES SUGGESTED BY THE EPA WILL BE TAKEN INTO CONSIDERATION AT THAT TIME. THE ARMY AGREES THAT THESE ISSUES WILL BE REVISITED DURING THE MANDATORY POST-ROD FIVE-YEAR REVIEWS.

COMMENT 11: RESULTS OF FIELD AND LABORATORY INVESTIGATIONS CONDUCTED FOR THE REMEDIATION OF OTHER CONTAMINATION SOURCES IRAS, NOVEMBER, 1989, STATED THERE ARE CURRENTLY STRUCTURES LOCATED ON THE M-1 SETTLING BASINS. NO OTHER INFORMATION WAS PRESENTED ON THIS FACT IN OTHER DOCUMENTS ON THIS IRA. IT IS NECESSARY TO FULLY DISCUSS THESE STRUCTURES AND THEIR TREATMENT RELATIVE TO THE ISV PROCESS. THE ARARS REGARDING THE TREATMENT OF THESE STRUCTURES MUST APPEAR IN THE SUBSEQUENT DECISION DOCUMENT.

RESPONSE: THE STRUCTURES REFERRED TO INCLUDE SEVERAL LARGE TANKS IN A CONCRETE BERMED AREA ON THE EAST BASIN. THESE STRUCTURES WILL BE

RELOCATED BEFORE IMPLEMENTATION OF THE ISV PROCESS. THE DRAFT FINAL DECISION DOCUMENT WAS REVISED TO DISCUSS RELOCATION OF THESE STRUCTURES (SECTION 6.0). SPECIFIC PROCEDURES FOR RELOCATION WILL BE PART OF THE IMPLEMENTATION DOCUMENT. THE ARARS REGARDING THESE STRUCTURES ARE DISCUSSED IN THE REVISED DECISION DOCUMENT.

COMMENT 12: IN CONCLUSION, ISV TECHNOLOGY IS CLASSIFIED BY EPA AS AN INNOVATIVE TECHNOLOGY; ONE THAT HAS BEEN DEVELOPED TO LARGE-SCALE AND IS READY FOR COMMERCIAL DEPLOYMENT, BUT FOR WHICH THEIR IS NOT A SIGNIFICANT COMMERCIAL EXPERIENCE BASE. IT IS NECESSARY TO THOROUGHLY EVALUATE ALL ASPECTS OF ISV APPLICABILITY FOR A SPECIFIC SITE PRIOR TO COMMITMENT TO LARGE SCALE OPERATION. GEOSAFE RECOMMENDS THAT TREATABILITY TESTING BE PERFORMED AS AN IMPORTANT PART OF THE APPLICABILITY EVALUATION. THE OBJECTIVES OF THE TREATABILITY TESTING INCLUDE GENERATION OF SPECIFIC OPERATIONAL PERFORMANCE DATA NEEDED TO SUPPORT OPERATING PARAMETERS/COMPLIANCE EFFORTS AND GENERATING OF DATA TO SUPPORT COMMUNITY RELATIONS EFFORTS. DEPENDING ON THE RESULTS OF THE TREATABILITY TESTING, GEOSAFE MAY DETERMINE THAT DEMONSTRATION TESTING IS ALSO ADVISABLE.

THE RMA PARTIES NEED TO DISCUSS THE POTENTIAL OF FURTHER TREATABILITY TESTING AND DEMONSTRATION TESTING TO DETERMINE EMISSIONS OF ARSENIC AND MERCURY AND TO REVISE THE RISK ANALYSIS OF THIS CLEANUP ALTERNATIVE FOR THE M-1 BASINS.

RESPONSE: TWO TREATABILITY TESTS HAVE BEEN SUCCESSFULLY PERFORMED ON THE M-1 SETTLING BASINS SLUDGE. RESULTS OF THESE TESTS HAVE BEEN DISCUSSED WITH AND DISTRIBUTED TO THE ORGANIZATIONS AND THE STATE. RESULTS SHOW THAT ISV IS AN EFFECTIVE TREATMENT PROCESS FOR THE M-1 SETTLING BASINS SLUDGE.

THE ARMY HAS AGREED TO PERFORM A DEMONSTRATION TEST IMMEDIATELY PRIOR TO IMPLEMENTATION. THE ARMY WILL KEEP THE ORGANIZATIONS AND THE STATE INFORMED DURING THIS ADDITIONAL TESTING.

SPECIFIC COMMENTS

COMMENT 1: P.8-1 DEPENDING ON WHAT IS LATER TO BE DONE WITH THE VITRIFIED MASS, THERE ARE POSSIBLE STANDARDS IN 40 CFR, PART 264, INCLUDING SUBPART X, THAT COULD BE UTILIZED FOR MONITORING OR ANALYSIS OF THE PROCESS.

ADDITIONALLY, THERE IS NO SPECIFIC DEWATERING SCENARIO SET FOR IN THE DISCUSSION. DUE TO THE PRESENCE OF ARSENIC, THE DEWATERED LIQUIDS COULD BE HANDLED BY THE CERCLA WASTEWATER TREATMENT SYSTEM.

RESPONSE: CONDENSATE FROM THE HOOD OF THE IN SITU VITRIFICATION TREATMENT SYSTEM AND ANY OTHER LIQUIDS GENERATED BY THIS IRA WILL BE HANDLED BY THE CERCLA WASTEWATER TREATMENT SYSTEM.

COMMENT 2: P.8-3 WE DISAGREE WITH THE STATEMENT THAT THERE ARE NO AIR ARARS. NESHAP LEVELS FOR ARSENIC AND MERCURY ARE RELEVANT AND APPROPRIATE. THE REMEDIAL ACTION WILL INCLUDE A STATIONARY POINT SOURCE OF AIR EMISSIONS FROM THE VENT EXHAUST AND MAY INVOLVE FUGITIVE EMISSIONS ESCAPING THE HOODS.

THE PROPOSED DECISION DOCUMENT INDICATES THAT THE WASTE MATERIAL IN THE M-1 BASINS ARE 8 PERCENT ARSENIC AND 0.5 PERCENT MERCURY. IF WE ESTIMATE THAT THE SLUDGE WEIGHS 2700 POUNDS PER CUBIC YARD AND THERE ARE 6,400 YARDS OF SLUDGE AT 8 PERCENT ARSENIC AND 0.5 PERCENT MERCURY, THERE ARE POTENTIAL EMISSIONS (ASSUMING THAT EVERYTHING IS EMITTED WITH A ONE-YEAR TIME FRAME) OF 43 TONS OF MERCURY AND 700 TONS OF ARSENIC WITHIN A ONE YEAR PERIOD.

THE NESHAP REGULATIONS PERMIT EMISSIONS OF ONLY APPROXIMATELY 3,000 GRAMS PER DAY OF MERCURY FROM MERCURY SMELTERS, CHLORALKALI PLANTS, AND SEWAGE SLUDGE INCINERATORS/DRYERS. POTENTIAL EMISSIONS FROM THE ISV BEFORE CONTROLS IS APPROXIMATELY 100,000 GRAMS PER DAY IF SPREAD OVER A ONE YEAR PERIOD. SINCE THE OPERATION WILL BE DONE IN LESS THAN ONE YEAR, THE CONTROL EFFICIENCY FOR MERCURY MUST BE GREATER THAN 97 PERCENT IF EMISSIONS ARE NOT TO EXCEED THOSE REQUIRED BY THE NESHAP. CONTROL EFFICIENCY SHOULD BE DISCUSSED IN THE DOCUMENTS.

THE ARSENIC NESHAP REGULATION FOR GLASS MANUFACTURING LIMITS EMISSIONS TO APPROXIMATELY 900 POUND PER YEAR OR GREATER THAN 85 PERCENT CONTROL. THE APPROXIMATE QUANTITY OF ARSENIC TO BE DEALT WITH BY THE ISV OPERATION IS APPROXIMATELY 1,400,000 POUNDS PER YEAR. ASSUMING 90 PERCENT IS RETAINED IN THE MELT, POTENTIAL EMISSIONS ARE APPROXIMATELY 140,000 POUNDS PER YEAR. TO REDUCE THESE EMISSIONS BELOW 900 POUNDS PER YEAR, GREATER THAN 99 PERCENT CONTROL EFFICIENCY WOULD BE NECESSARY. CONTROL EFFICIENCY AND MELT RETENTION OF ARSENIC SHOULD BE DISCUSSED IN THE DOCUMENTS.

SINCE THE NESHAP REGULATIONS ARE CONCERNED WITH THESE LEVELS OF EMISSIONS, ONE MIGHT EXPECT THAT GREATER EMISSION LEVELS OF ARSENIC AND MERCURY MIGHT THREATEN PUBLIC HEALTH IN THE AREA. THE ISV CLEANUP OF THE M-1 BASINS HAS POTENTIAL FOR SUCH EMISSIONS AND YET THESE WERE NOT CONSIDERED IN THE SELECTION PROCESS. A RISK ANALYSIS OF THE AIR EMISSIONS SHOULD BE CONSIDERED IN THE SELECTION OF THE CLEANUP ALTERNATIVE TO ENSURE ALL EMISSIONS LIMITATIONS PROTECT HUMAN HEALTH AND THE ENVIRONMENT.

RESPONSE: THE ARSENIC NESHAPS FOR GLASS MANUFACTURING IS IDENTIFIED AS RELEVANT AND APPROPRIATE IN THE FINAL DECISION DOCUMENT. THE STATE STANDARD, OUTLINED IN 5 CCR 1007-3 REGULATION 8 FOR MERCURY IS ALSO IDENTIFIED AS RELEVANT AND APPROPRIATE.

COMMENT 3: P.8-3, FIRST PARAGRAPH, THIS PARAGRAPH SEEMS TO BE A "BOILERPLATE" STATEMENT. IT IS NOT ACCURATE WITH REGARD TO NAAQS APPLYING TO AIR QUALITY CONTROL REGIONS WHICH ARE DISSIMILAR TO THIS IRA AREA, AND WITH REGARD TO APPLICABILITY TO LARGE AIR MASSES. SEE PREVIOUSLY AGREED TO LANGUAGE FOR PAST IRAS.

RESPONSE: THIS SECTION HAS BEEN REVISED TO REFLECT THE ARMY'S DETERMINATION THAT NAAQS STANDARDS ARE NEITHER APPLICABLE NOR RELEVANT AND APPROPRIATE TO APPLY TO A SPECIFIC EMISSIONS SOURCE SUCH AS THIS TREATMENT SYSTEM.

COMMENT 4: P.8-3, 2ND PARAGRAPH, ASSUMING THAT THE 40 CFR PARTS 60 AND 61 REGULATIONS WERE DEVELOPED TO PREVENT AMBIENT AIR CONCENTRATIONS OF MERCURY AND ARSENIC (THEREBY TO PROTECT PUBLIC HEALTH), THESE AMBIENT CONCENTRATION STANDARDS NEED TO BE REANALYZED AS POTENTIAL ARARS. THE APPROPRIATE BACKGROUND DOCUMENTS NEED TO BE REVIEWED TO DETERMINE THE MERCURY AND ARSENIC CONCENTRATIONS WHICH MAY HAVE BEEN THE GOALS BEHIND THESE REGULATIONS.

THE CERCLA COMPLIANCE WITH OTHER LAWS MANUAL (EPA/540G-8/009) ON PAGES 2-5 AND 2-6 LIST NESHAP EMISSION RATES FOR MERCURY AND ARSENIC. THESE RATES, WHILE APPLICABLE TO MERCURY SMELTERS, CHLORALKALI PLANTS, SEWAGE SLUDGE INCINERATORS/DRYERS OR GLASS MANUFACTURING, SHOW A CONCERN BY EPA FOR EMISSIONS OF MERCURY AND ARSENIC. POTENTIAL EMISSIONS FROM THE ISV REMEDIATION COULD BE FAR GREATER THAN THESE NESHAP EMISSION RATES AND THEREFORE MAY HAVE THE POTENTIAL FOR EXCEEDING THE GOAL AMBIENT CONCENTRATIONS BEHIND THE NESHAP REGULATIONS. THE NESHAPS RATES SHOULD BE SELECTED AS RELEVANT AND APPROPRIATE STANDARDS FOR THE ISV PROCESS, UNLESS HEALTH-BASED STANDARDS ARE MORE STRINGENT.

RESPONSE: SEE RESPONSE TO EPA'S SPECIFIC COMMENT NO. 2.

COMMENT 5: PAGE 8-4. THE REPORT DOES NOT RECOGNIZE THAT EMISSIONS FROM THE IN-SITU VITRIFICATION PROCESS COULD BE SUBJECT TO "ACTION-SPECIFIC ARARS". THE REPORT DISCUSSES CONSTRUCTION TYPE EMISSIONS AND IGNORES EMISSIONS RESULTING FROM THE OPERATION OF THE VITRIFICATION PROCESS.

RESPONSE: THE FINAL DECISION DOCUMENT ADDRESSES EMISSIONS FROM THE OPERATION OF THE IN SITU VITRIFICATION PROCESS UNDER ACTION-SPECIFIC ARARS. THIS INFORMATION CAN BE FOUND IN THE OPERATION OF TREATMENT SYSTEM SECTION OF THE ACTION-SPECIFIC ARARS. CHEMICAL-SPECIFIC ARARS ARE ALSO SELECTED. SEE RESPONSE TO EPA'S SPECIFIC COMMENT NO. 2.

COMMENT 6: PAGE 8-4, SECTION 8.4, AN ARAR(S) NEEDS TO BE SELECTED IN THE DRAFT FINAL DECISION DOCUMENT THAT WILL BE THE STANDARD OF PERFORMANCE FOR THE CAPTURE EFFICIENCY OF THE HOOD. THE PARTIES NEED TO DISCUSS AS POTENTIAL ARARS: THE AQCR REGULATION NO. 1, SECTION II, SMOKE AND OPACITY, AND EPA'S NE SOURCE PERFORMANCE STANDARDS FOR RELEVANT AND APPROPRIATE SUBPARTS, SUCH AS NSPS, PART 60, SUBPART I, HOT MIX ASPHALT, 60.92(A)2; SUBPART F, PORTLAND CEMENT, 60.62(B)(2); AND PART 60, SUBPART NA, STANDARDS OF PERFORMANCE FOR SECONDARY EMISSIONS FROM BASIC OXYGEN PROCESS STEEL-MAKING, 60.142(A)(1), FUGITIVE EMISSION CONTROL, 10 PERCENT OPACITY, AND SUBPART 000, STANDARDS OF PERFORMANCE FOR NONMETALLIC MINERAL PROCESSING PLANTS.

RESPONSE: THE FINAL DECISION DOCUMENT ADDRESSES ARARS FOR THE CAPTURE EFFICIENCY OF THE IRA TREATMENT SYSTEM.

COMMENT 7: PAGE 8-5, SECOND PARAGRAPH, THIS CANNED STATEMENT MAY BE APPROPRIATE FOR THE CONSTRUCTION PHASE OF THIS IRA. HOWEVER, IT IS IRRELEVANT TO THE OPERATION OF THE PROCESS SINCE THE PROCESS CANNOT BE SHUT DOWN QUICKLY AND INVOLVES HEATING OF SOILS, NOT INSTALLATION OF WELLS.

RESPONSE: THIS PARAGRAPH ONLY ADDRESSES THE CONSTRUCTION PHASE OF THIS IRA AND THE RELATED EXCAVATION OF MATERIAL AND IS CONTAINED IN THAT SECTION OF THE DOCUMENT. THE TREATMENT SYSTEM WILL BE DESIGNED TO PREVENT THE EMISSION OF 99.99 PERCENT OF THE ORGANICS IN THE GROUND AT THE BEGINNING OF THE TREATMENT PROCESS. AIR POLLUTION CONTROLS INCLUDE A PACKED SCRUBBER COLUMN AND ACTIVATED CARBON ABSORBER.